FIG. 1

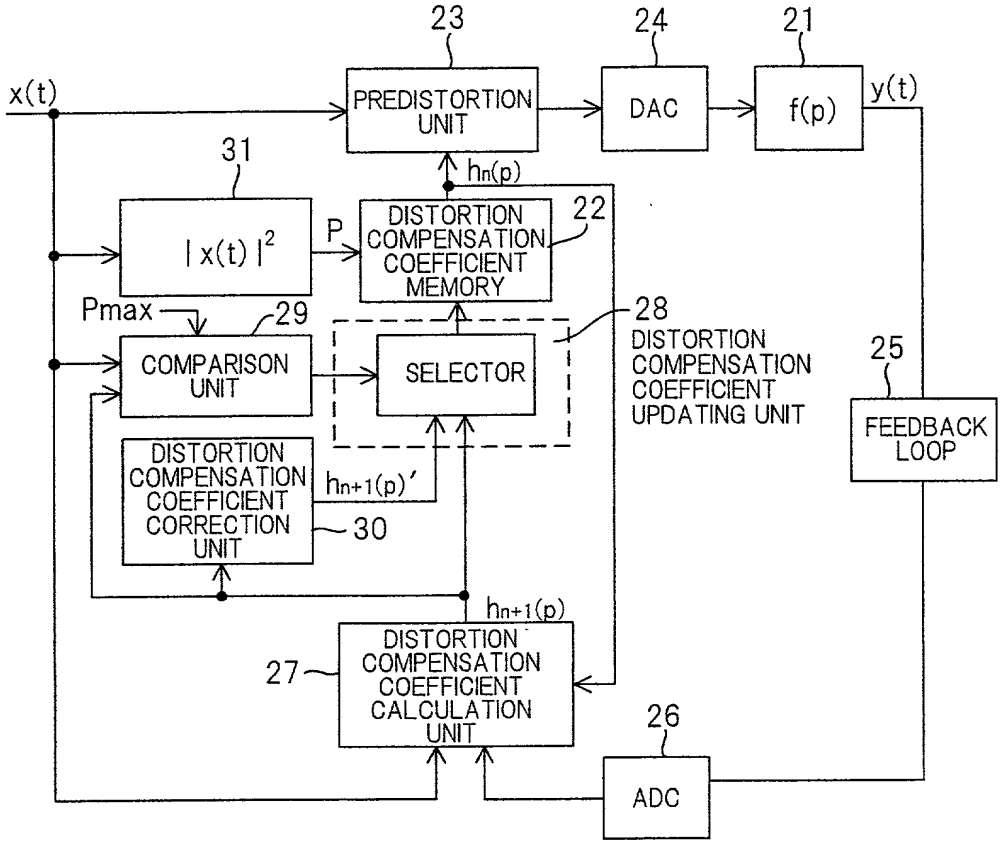
23
24
21
x(t)
PREDISTORTION UNIT
DAC
f(p)
y(t)
31
hn(p)
| x(t) |2
P
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
Pmax
29
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
25
COMPARISON UNIT
SELECTOR
FEEDBACK LOOP
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
hn+1(p)'
30
hn+1(p)
27
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
26
ADC

FIG. 2

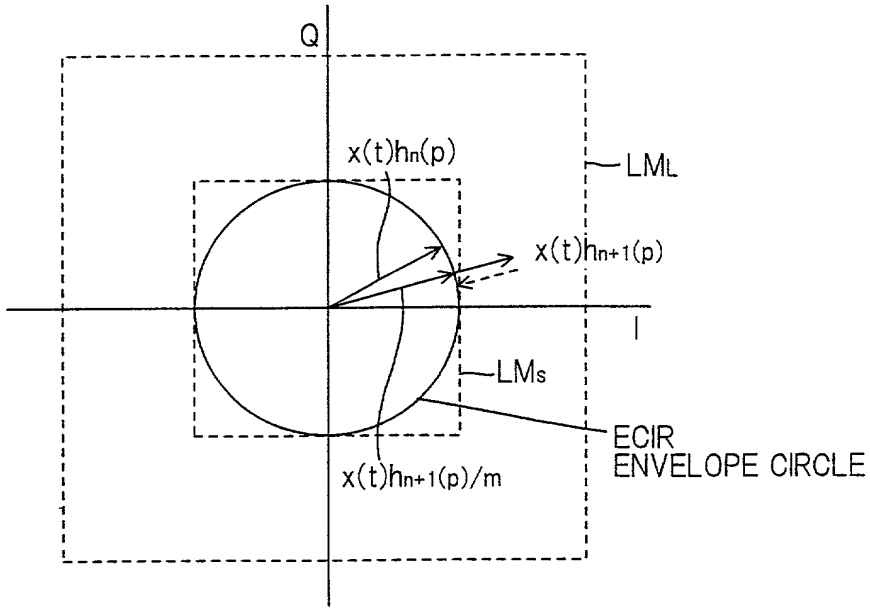
Q
x(t)hn(p)
LML
x(t)hn+1(p)
I
LMs
ECIR
ENVELOPE CIRCLE
x(t)hn+1(p)/m

FIG. 3

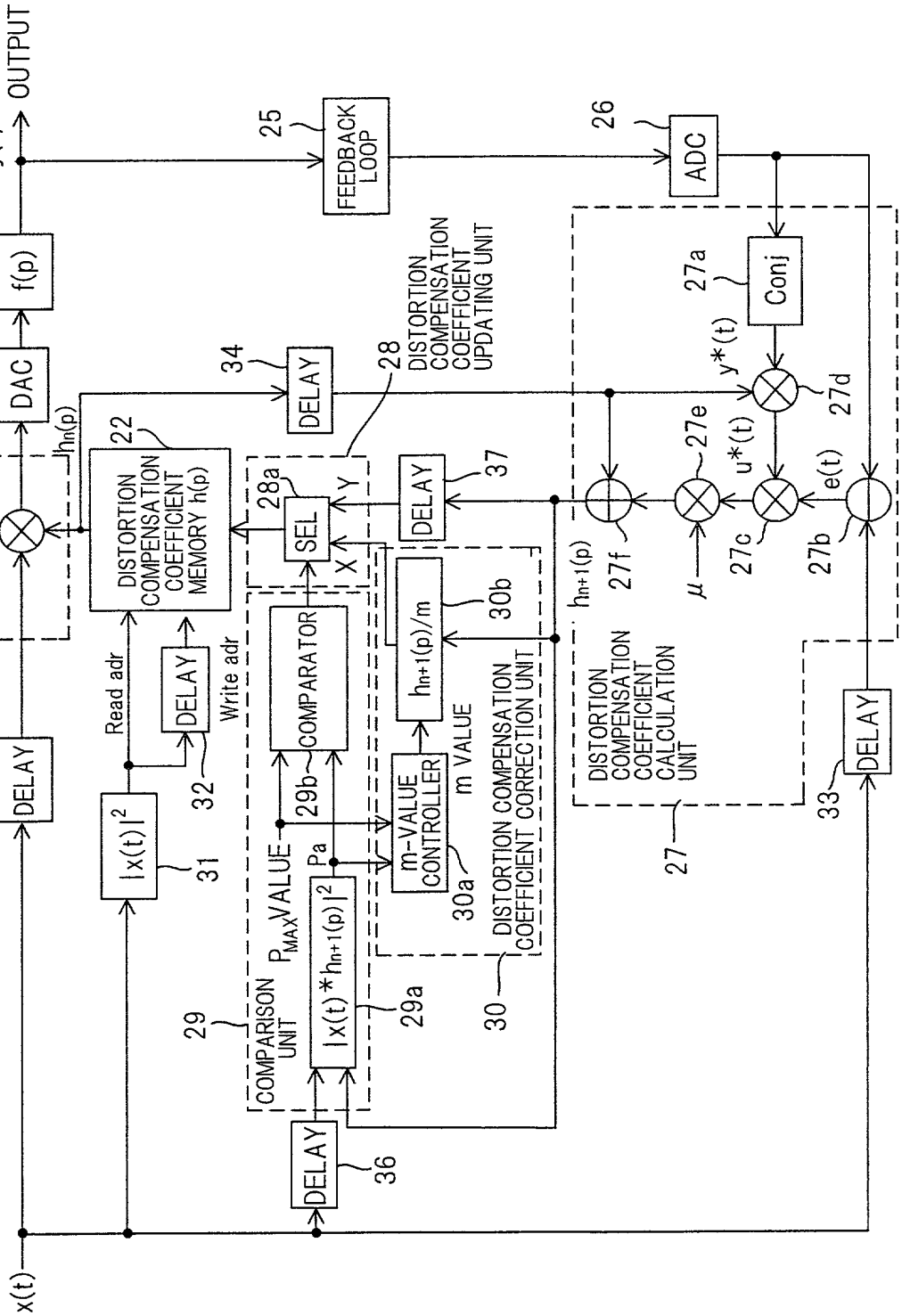
x(t)
OUTPUT
y(t)
f(p)
DAC
ADC
FEEDBACK LOOP
PREDISTORTION UNIT
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
COMPARISON UNIT
COMPARATOR
SEL
m-VALUE CONTROLLER
m VALUE
Conj
DELAY
Read adr
Write adr
P_{MAX}VALUE
Pa
$|x(t)|^2$
$|x(t)*h_{n+1}(p)|^2$
$h_{n+1}(p)/m$
$h_{n+1}(p)$
$h_n(p)$
y*(t)
u*(t)
e(t)
μ
X
Y

FIG. 4

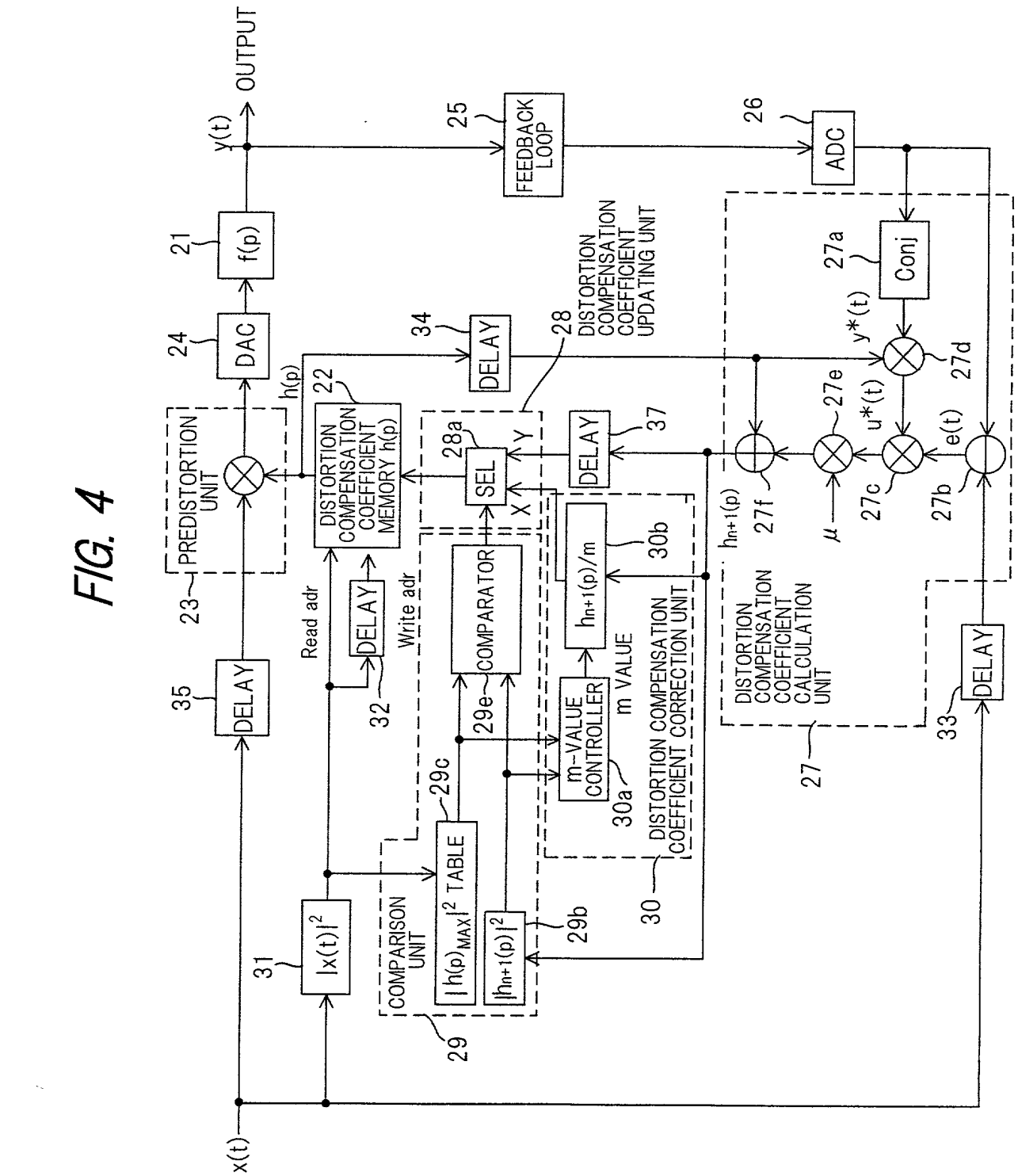
x(t)
OUTPUT
y(t)
f(p)
DAC
ADC
FEEDBACK LOOP
PREDISTORTION UNIT
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
DELAY
SEL
COMPARATOR
m-VALUE CONTROLLER
m VALUE
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
COMPARISON UNIT
TABLE
Conj
Read adr
Write adr
h(p)
X
Y
μ
e(t)
u*(t)
y*(t)

FIG. 5

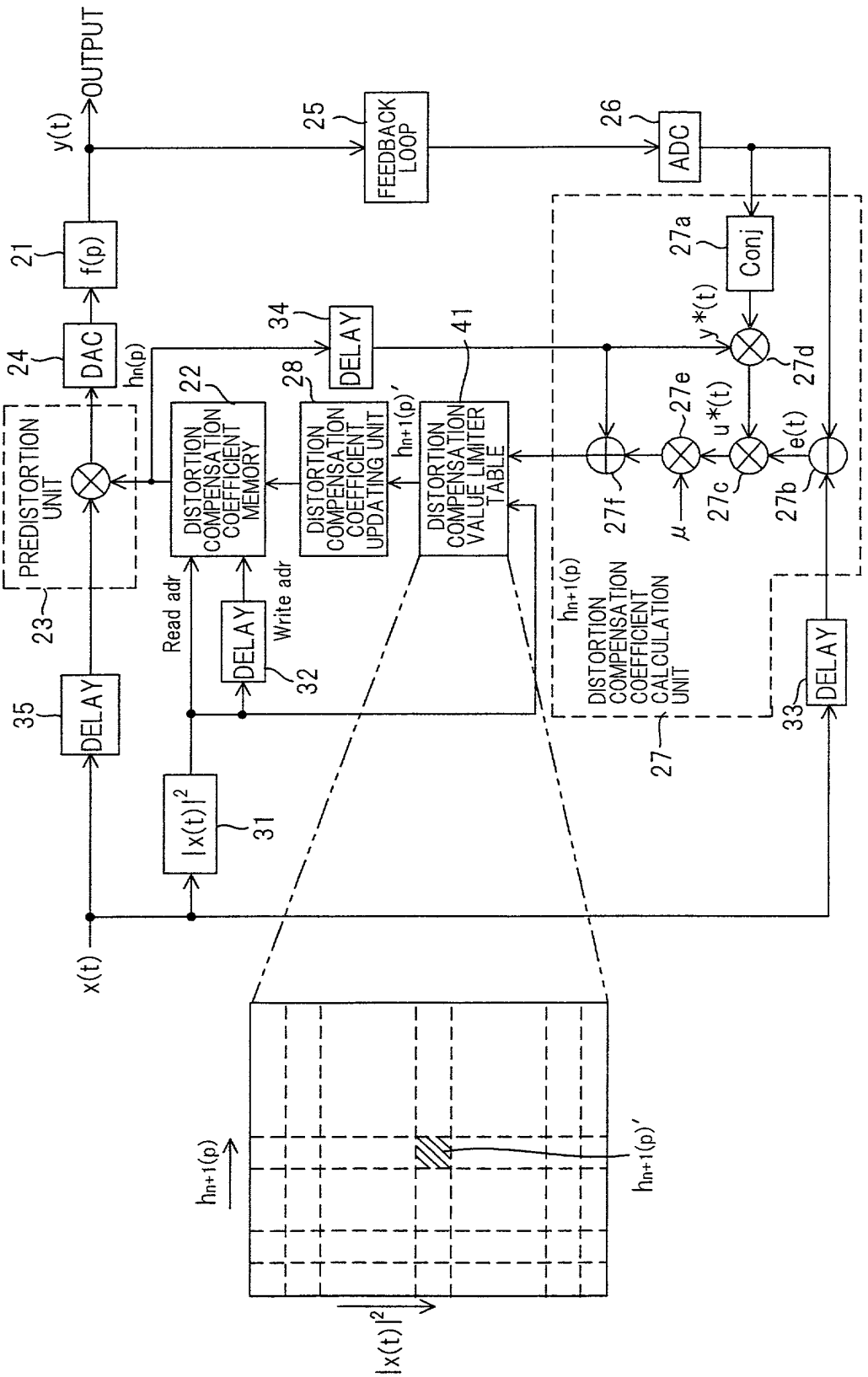
x(t)
y(t)
OUTPUT
PREDISTORTION UNIT
23
f(p)
21
DAC
24
DELAY
35
$|x(t)|^2$
31
DELAY
32
Read adr
Write adr
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
28
DISTORTION COMPENSATION VALUE LIMITER TABLE
41
DELAY
34
$h_n(p)$
$h_{n+1}(p)'$
FEEDBACK LOOP
25
ADC
26
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
$h_{n+1}(p)$
Conj
27a
$y^*(t)$
27d
27e
$u^*(t)$
27f
μ
27c
e(t)
27b
DELAY
33
$h_{n+1}(p)$
$h_{n+1}(p)'$
$|x(t)|^2$

FIG. 6

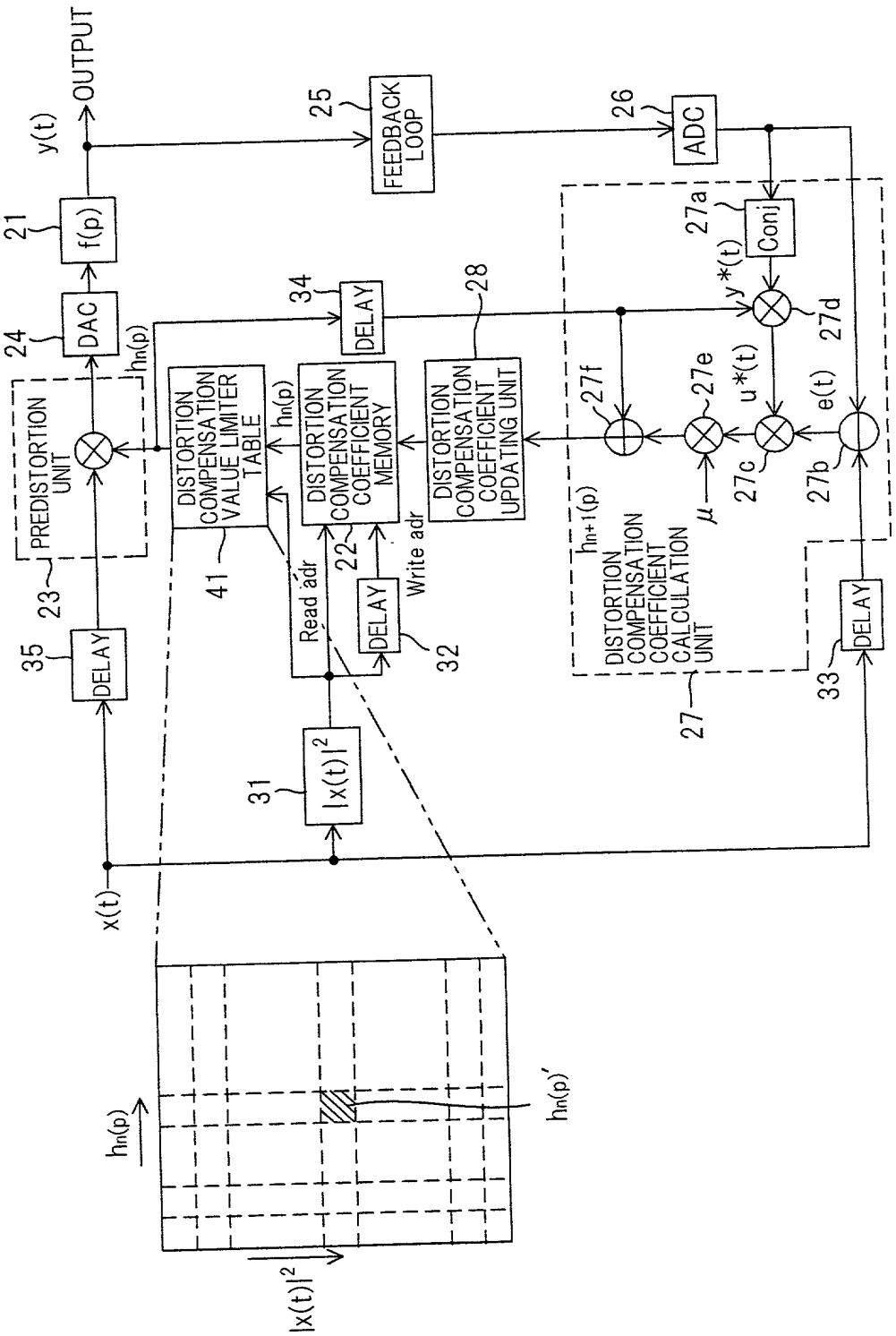
OUTPUT
y(t)
21
f(p)
24
DAC
PREDISTORTION UNIT
23
DELAY
35
x(t)
25
FEEDBACK LOOP
26
ADC
27a
Conj
y*(t)
27d
34
DELAY
28
hn(p)
DISTORTION COMPENSATION VALUE LIMITER TABLE
41
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
Read adr
Write adr
DELAY
32
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
27f
27e
u*(t)
e(t)
27b
27c
μ
hn+1(p)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
33
DELAY
31
|x(t)|2
hn(p)
hn(p)'
|x(t)|2

FIG. 7

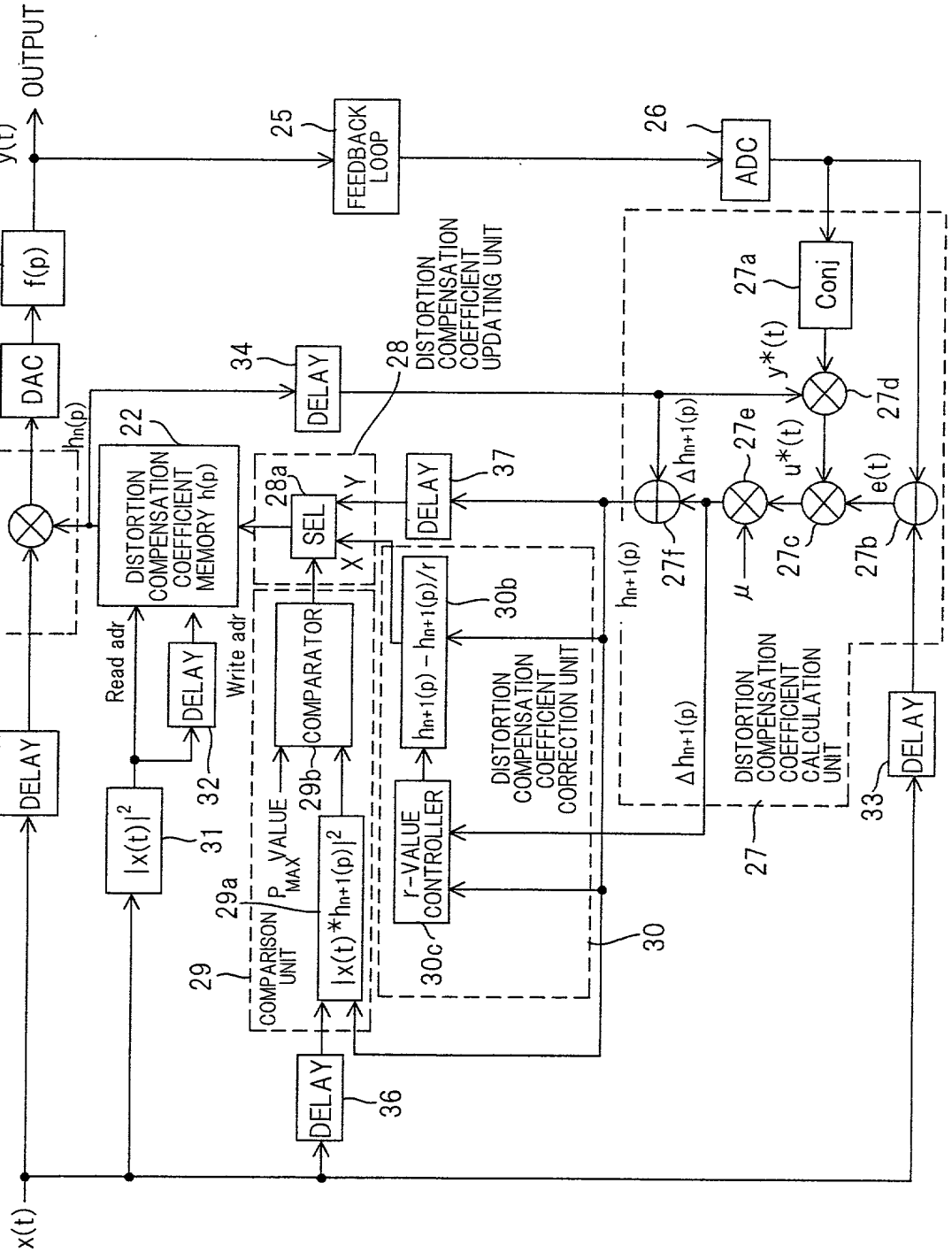
x(t)
y(t)
OUTPUT
PREDISTORTION UNIT
23
f(p)
21
DAC
24
DELAY
35
DELAY
36
DELAY
37
DELAY
34
DELAY
33
DELAY
32
FEEDBACK LOOP
25
ADC
26
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
22
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
28
SEL
28a
Read adr
Write adr
COMPARATOR
29b
COMPARISON UNIT
29
29a
P_MAX VALUE
|x(t)|²
31
|x(t)*h_n+1(p)|²
r-VALUE CONTROLLER
30c
h_n+1(p) − h_n+1(p)/r
30b
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
30
h_n+1(p)
Δh_n+1(p)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
Conj
27a
y*(t)
27d
u*(t)
27e
e(t)
27b
μ
27c
27f
h_n(p)
X
Y

FIG. 8

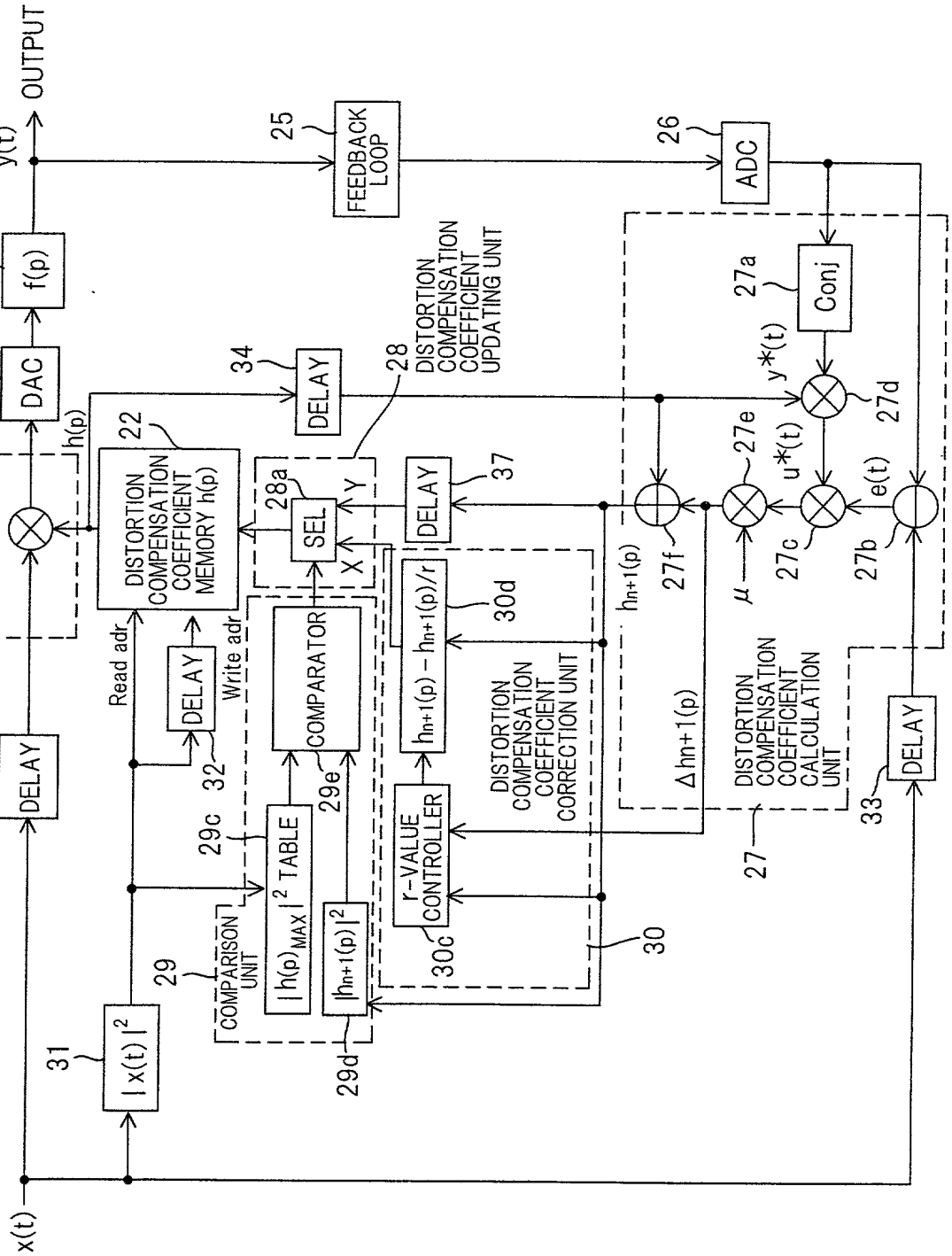
x(t)
OUTPUT
y(t)
f(p)
DAC
PREDISTORTION UNIT
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
h(p)
DELAY
Read adr
Write adr
COMPARATOR
SEL
X
Y
DELAY
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
FEEDBACK LOOP
ADC
Conj
y*(t)
u*(t)
e(t)
μ
Δhn+1(p)
hn+1(p)
hn+1(p) − hn+1(p)/r
r-VALUE CONTROLLER
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
COMPARISON UNIT
|h(p)MAX|2 TABLE
|hn+1(p)|2
|x(t)|2
21
22
23
24
25
26
27
27a
27b
27c
27d
27e
27f
28
28a
29
29c
29d
29e
30
30c
30d
31
32
33
34
35
37

FIG. 9

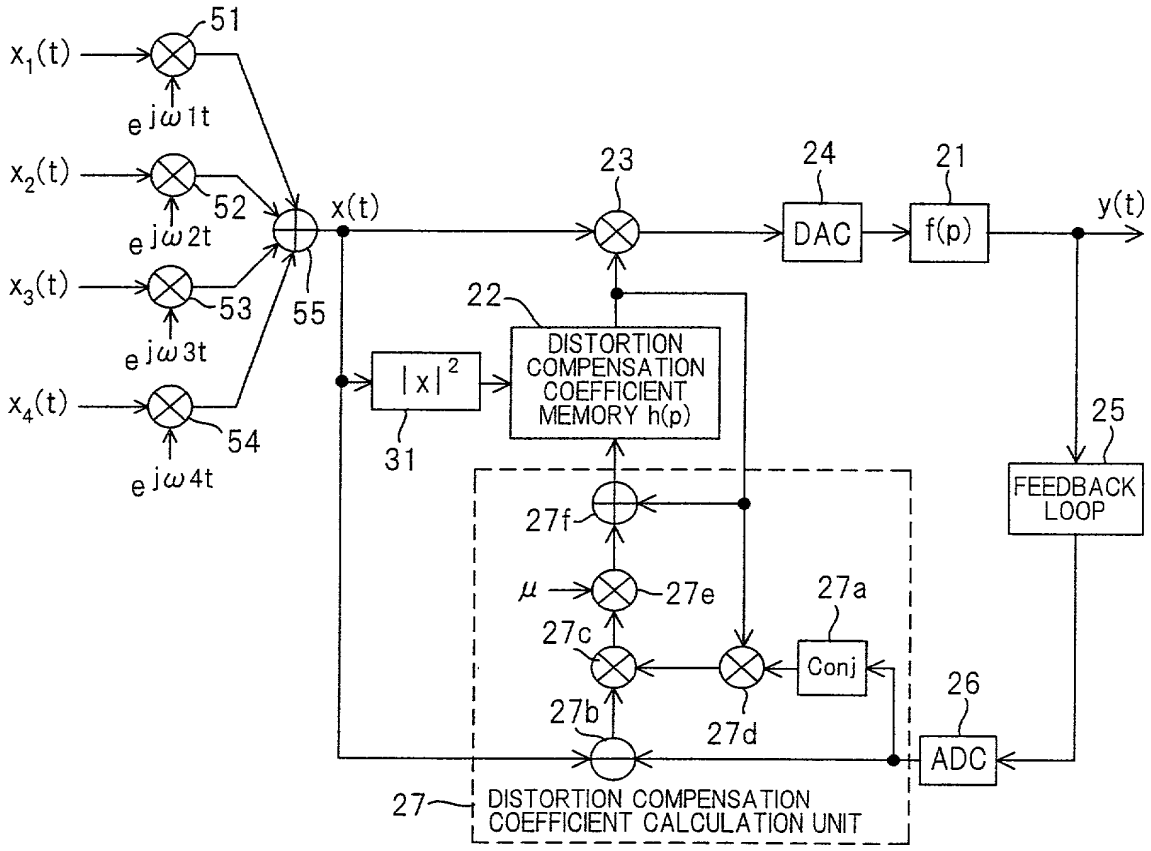
$x_1(t)$
51
$e^{j\omega 1t}$
$x_2(t)$
52
$e^{j\omega 2t}$
$x_3(t)$
53
$e^{j\omega 3t}$
$x_4(t)$
54
$e^{j\omega 4t}$
55
x(t)
23
24
DAC
21
f(p)
y(t)
22
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
$|x|^2$
31
25
FEEDBACK LOOP
27f
μ
27e
27a
27c
Conj
26
27b
27d
ADC
27
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT

FIG. 10

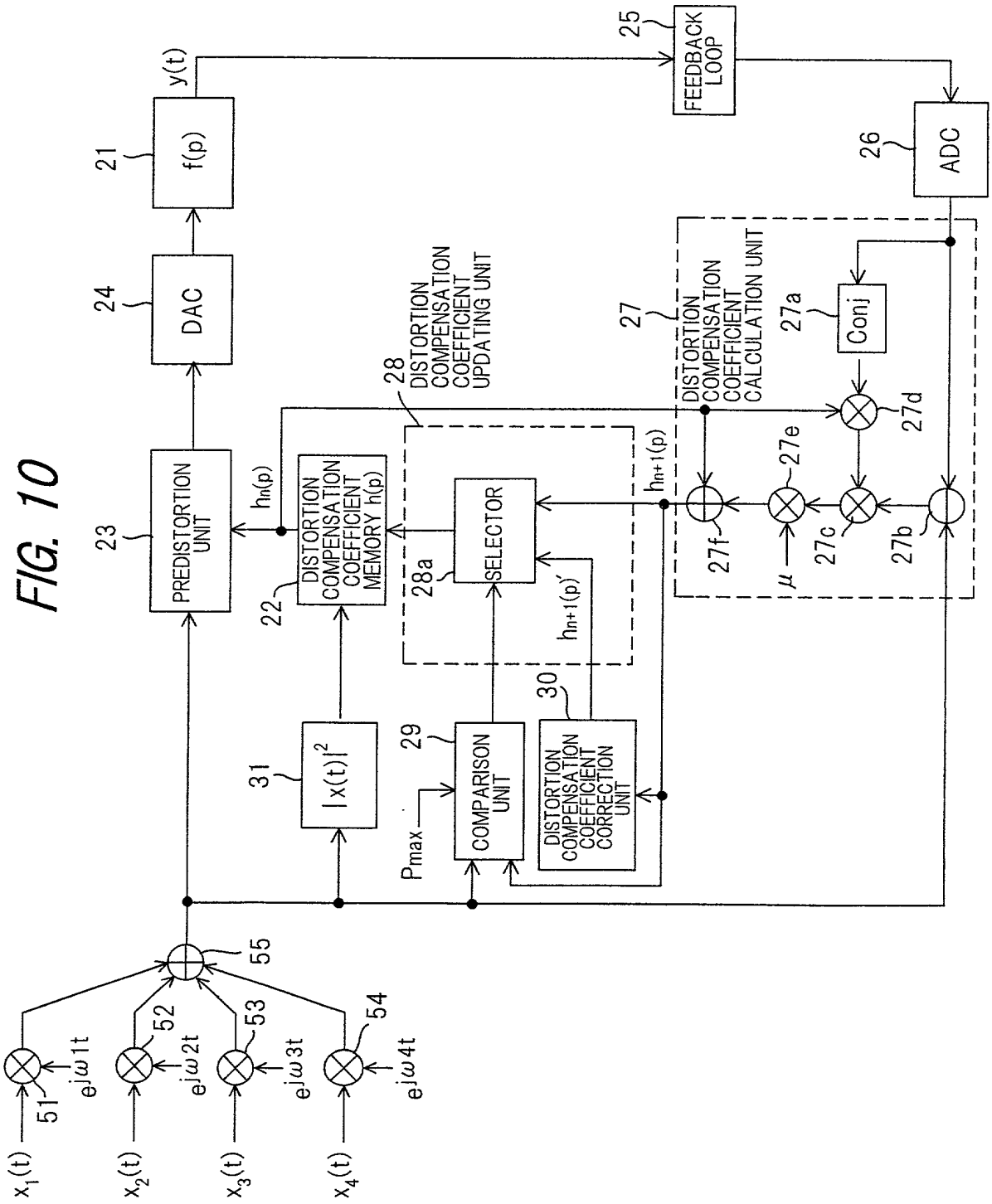
$x_1(t)$
$x_2(t)$
$x_3(t)$
$x_4(t)$
51
52
53
54
55
$e^{j\omega 1t}$
$e^{j\omega 2t}$
$e^{j\omega 3t}$
$e^{j\omega 4t}$
23
PREDISTORTION UNIT
24
DAC
21
f(p)
y(t)
25
FEEDBACK LOOP
26
ADC
$h_n(p)$
22
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
28a
SELECTOR
$h_{n+1}(p)$
$h_{n+1}(p)'$
27
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27a
Conj
27d
27e
27f
27c
27b
μ
30
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
29
COMPARISON UNIT
Pmax
31
$|x(t)|^2$

FIG. 11

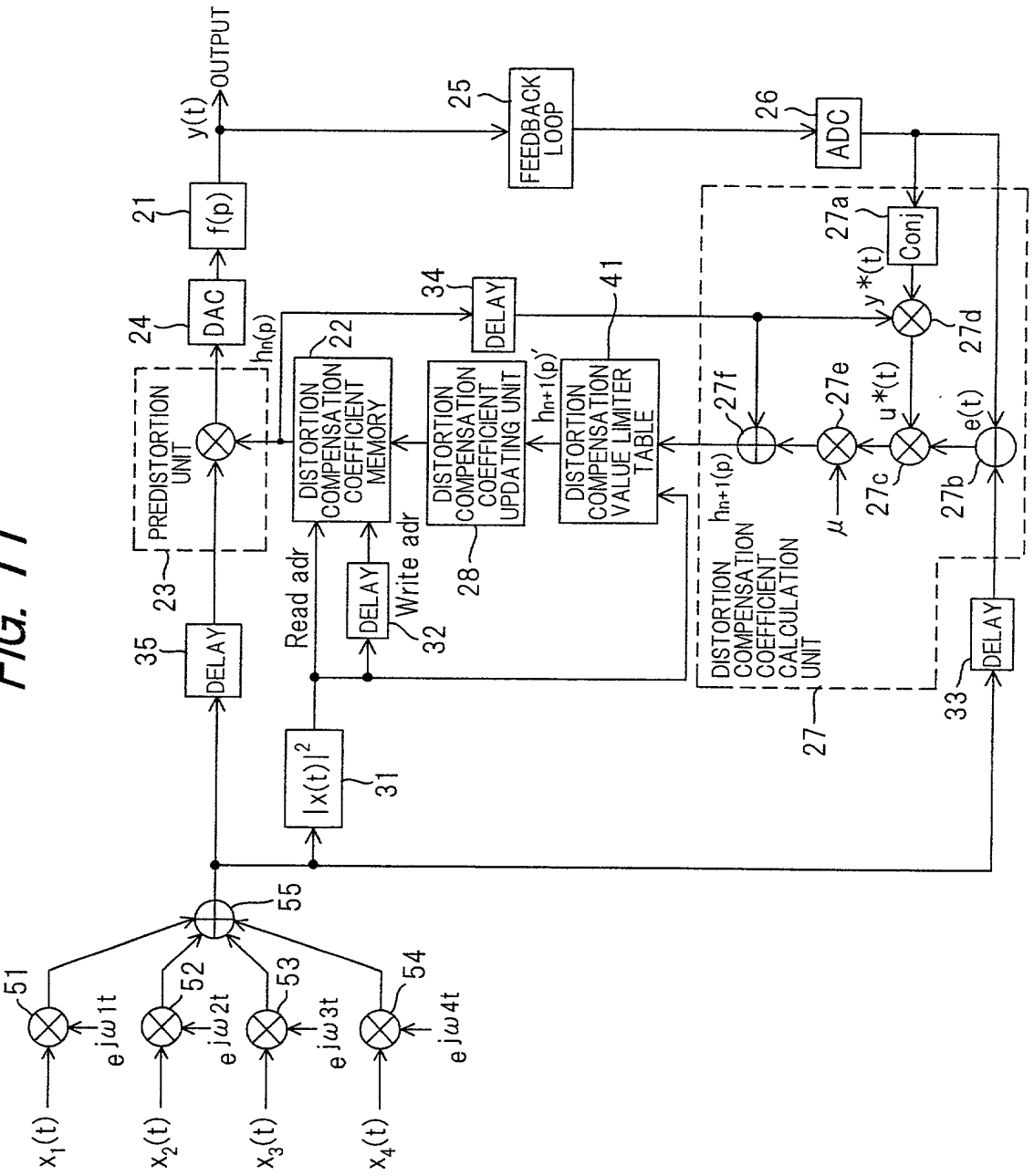
OUTPUT
y(t)
25
FEEDBACK LOOP
26
ADC
21
f(p)
24
DAC
PREDISTORTION UNIT
23
22
DISTORTION COMPENSATION COEFFICIENT MEMORY
34
DELAY
41
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
28
DISTORTION COMPENSATION VALUE LIMITER TABLE
27a
Conj
y*(t)
27d
27e
u*(t)
27f
27c
27b
e(t)
μ
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
35
DELAY
Read adr
DELAY
Write adr
32
33
DELAY
31
|x(t)|2
55
51
52
53
54
x1(t)
x2(t)
x3(t)
x4(t)

FIG. 12

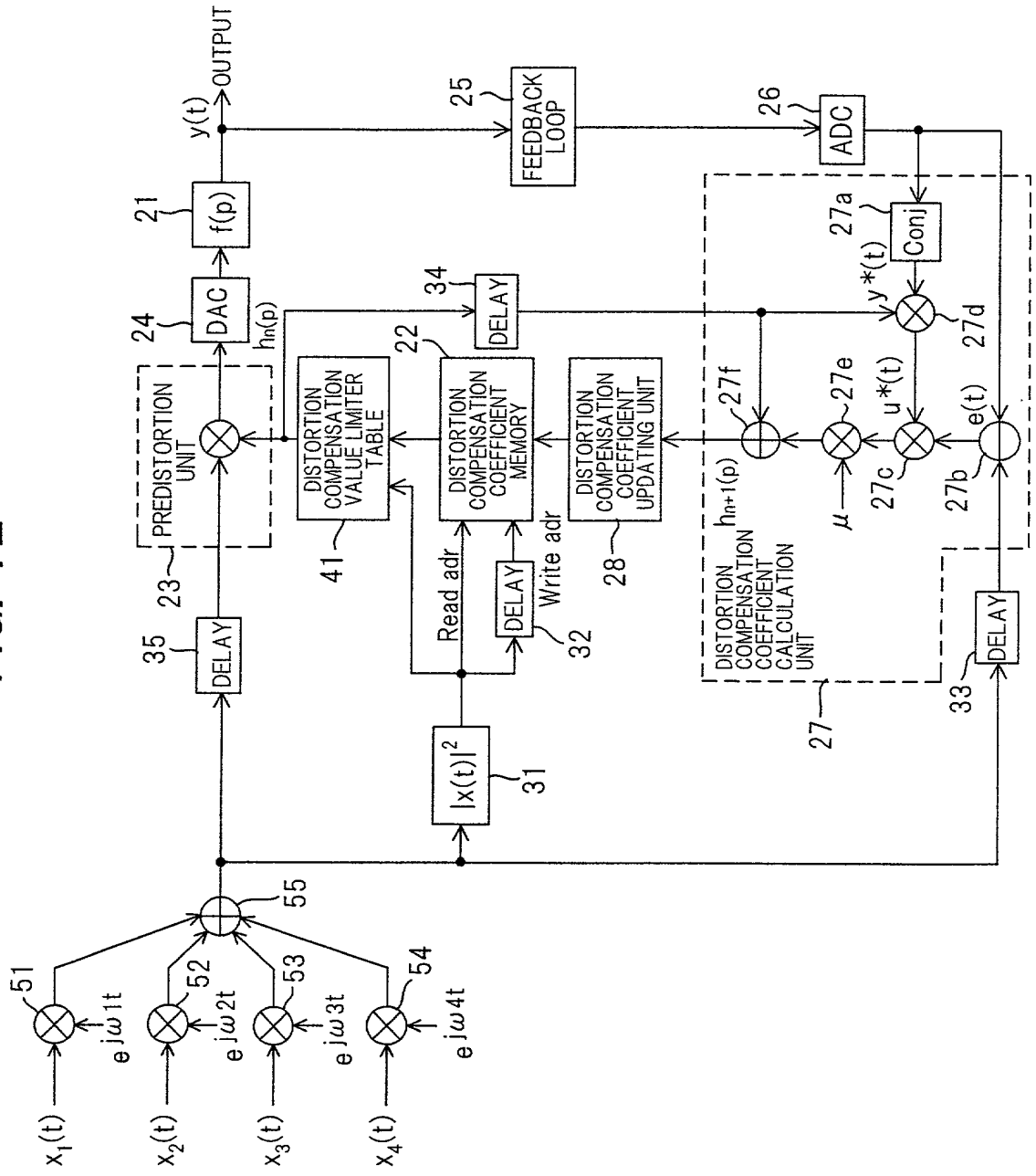
x1(t)
x2(t)
x3(t)
x4(t)
e jω1t
e jω2t
e jω3t
e jω4t
51
52
53
54
55
|x(t)|2
31
Read adr
DELAY
Write adr
32
DELAY
35
PREDISTORTION UNIT
23
DAC
24
f(p)
21
y(t)
OUTPUT
hn(p)
DISTORTION COMPENSATION VALUE LIMITER TABLE
41
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
28
DELAY
34
FEEDBACK LOOP
25
ADC
26
Conj
27a
y*(t)
27d
u*(t)
27c
μ
27e
hn+1(p)
27f
e(t)
27b
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
DELAY
33

FIG. 13

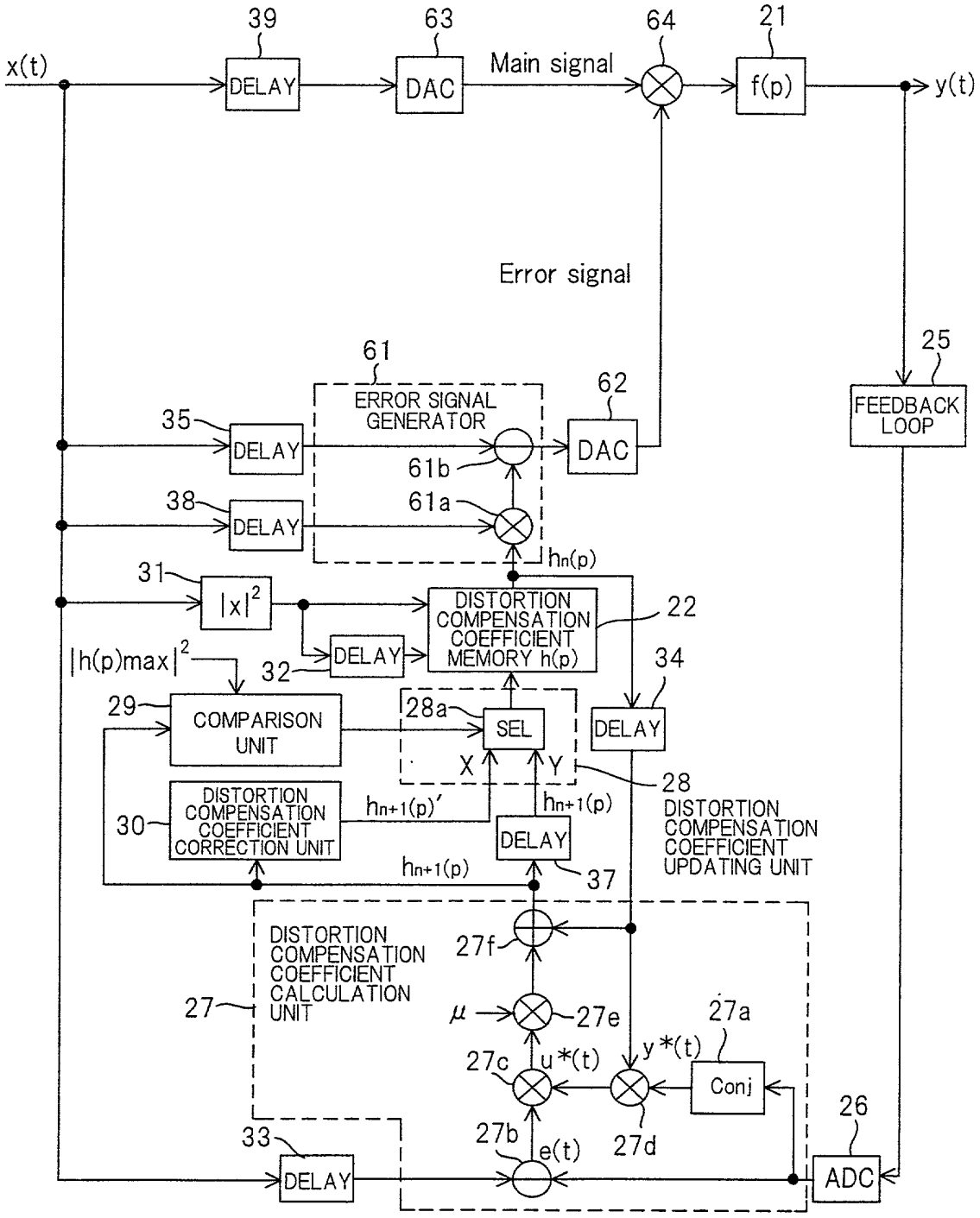
x(t)
39
DELAY
63
DAC
Main signal
64
21
f(p)
y(t)
Error signal
25
FEEDBACK LOOP
61
ERROR SIGNAL GENERATOR
62
35
DELAY
61b
DAC
38
DELAY
61a
hn(p)
31
|x|2
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
22
|h(p)max|2
32
DELAY
34
29
COMPARISON UNIT
28a
SEL
DELAY
X
Y
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
30
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
hn+1(p)'
hn+1(p)
DELAY
37
hn+1(p)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
27f
μ
27e
27a
27c
u*(t)
y*(t)
Conj
26
27b
e(t)
27d
33
DELAY
ADC

FIG. 14

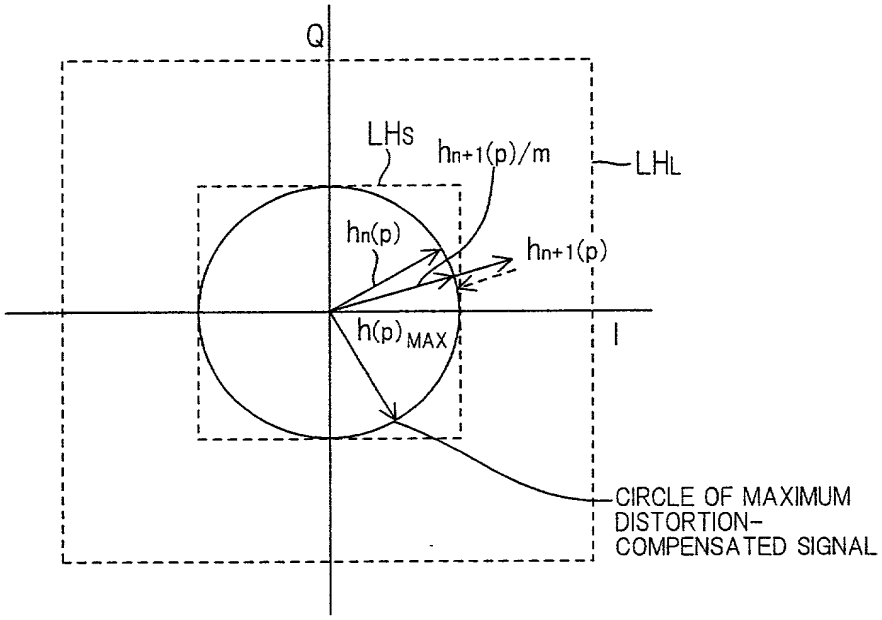
Q
LHs
hn+1(p)/m
LHL
hn(p)
hn+1(p)
h(p)MAX
I
CIRCLE OF MAXIMUM DISTORTION-COMPENSATED SIGNAL

FIG. 19

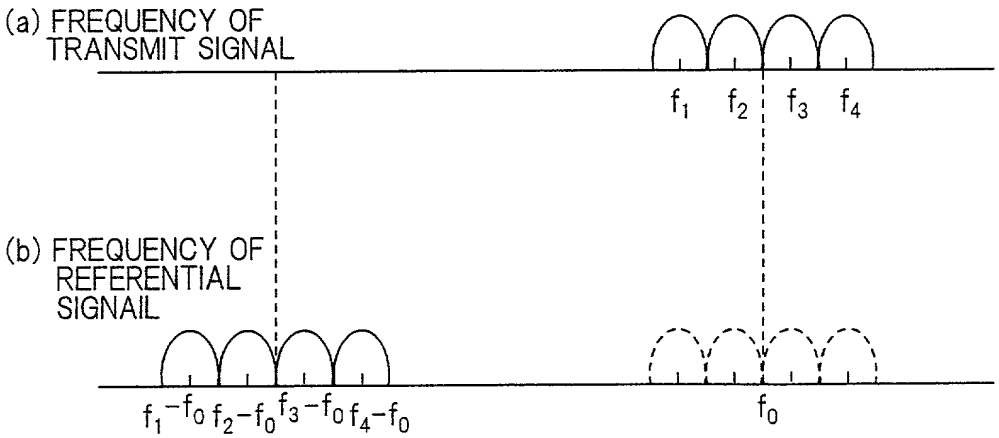
(a) FREQUENCY OF TRANSMIT SIGNAL
f1 f2 f3 f4
(b) FREQUENCY OF REFERENTIAL SIGNAIL
f1−f0 f2−f0 f3−f0 f4−f0
f0

FIG. 15

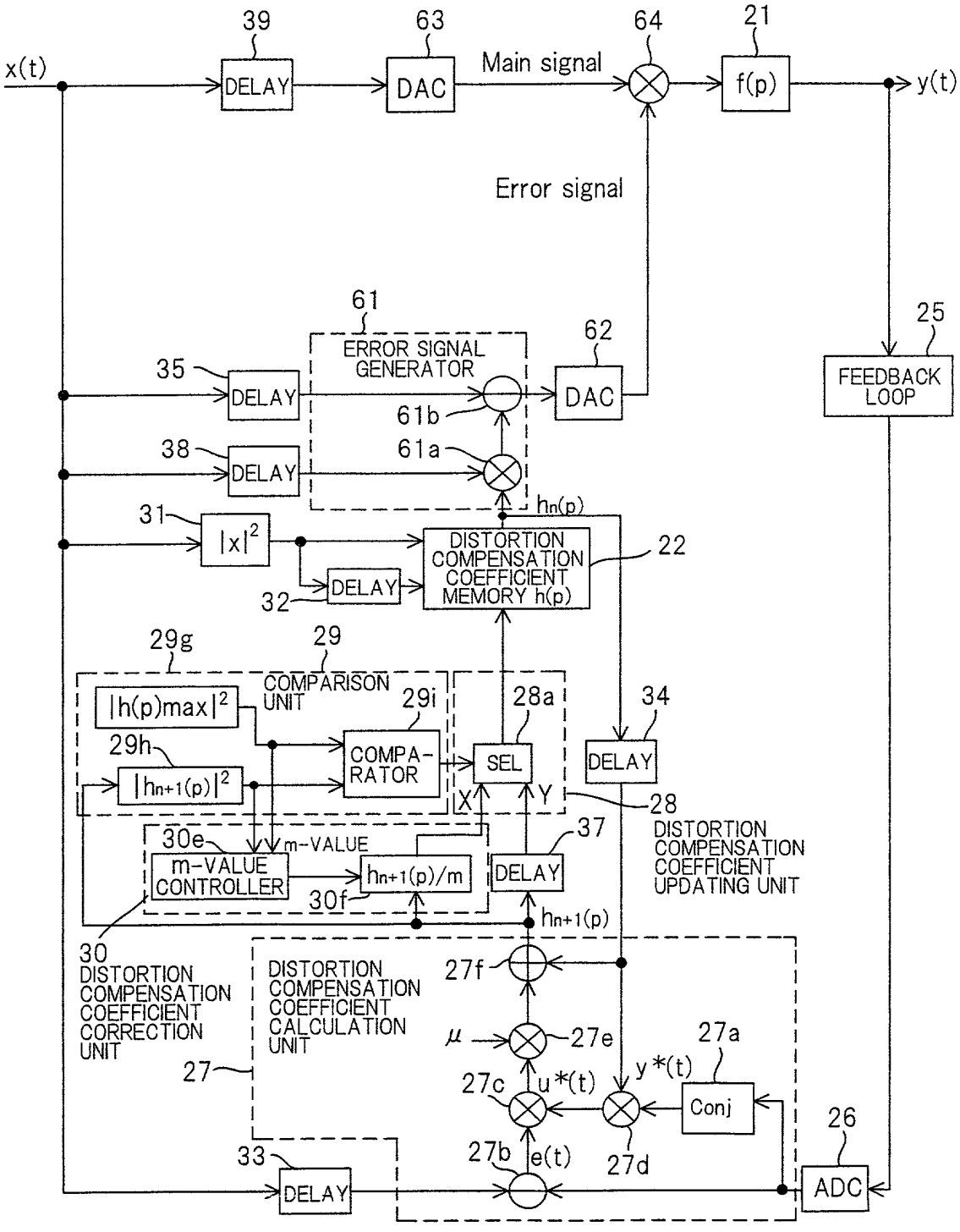
x(t)
39
DELAY
63
DAC
Main signal
64
21
f(p)
y(t)
Error signal
61
ERROR SIGNAL GENERATOR
62
25
FEEDBACK LOOP
35
DELAY
61b
DAC
38
DELAY
61a
hn(p)
31
|x|2
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
22
32
DELAY
29g
29
COMPARISON UNIT
|h(p)max|2
29i
28a
34
29h
|hn+1(p)|2
COMPA-RATOR
SEL
DELAY
X
Y
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
30e
m-VALUE
37
m-VALUE CONTROLLER
hn+1(p)/m
DELAY
30f
hn+1(p)
30
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27f
μ
27e
27a
27
27c
u*(t)
y*(t)
Conj
26
33
27b
e(t)
27d
DELAY
ADC

FIG. 16

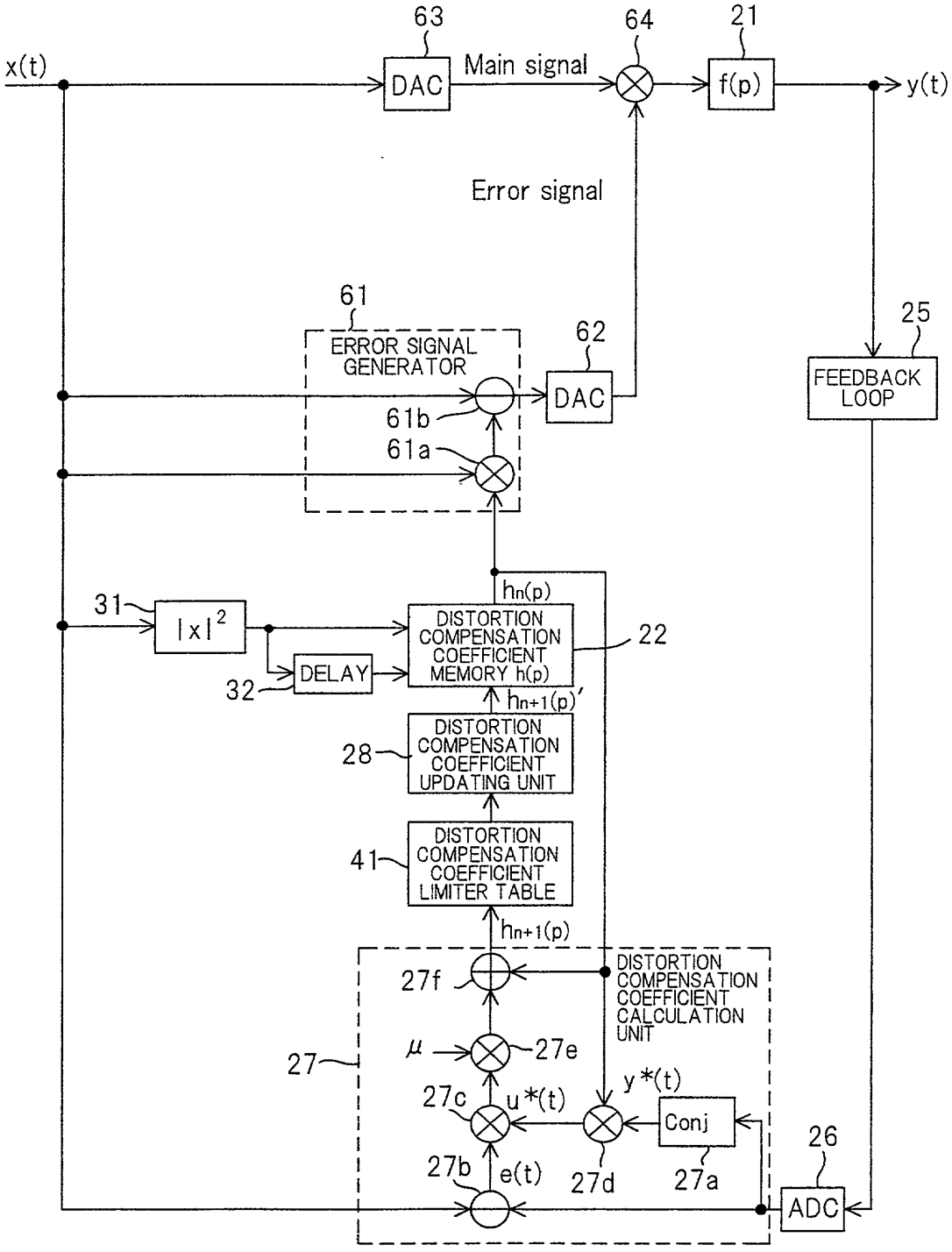
x(t)
63
DAC
Main signal
64
21
f(p)
y(t)
Error signal
61
ERROR SIGNAL GENERATOR
62
DAC
61b
61a
25
FEEDBACK LOOP
hn(p)
31
|x|2
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
22
DELAY
32
hn+1(p)'
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
41
DISTORTION COMPENSATION COEFFICIENT LIMITER TABLE
hn+1(p)
27f
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
μ
27e
y*(t)
27c
u*(t)
Conj
26
27b
e(t)
27d
27a
ADC

FIG. 17

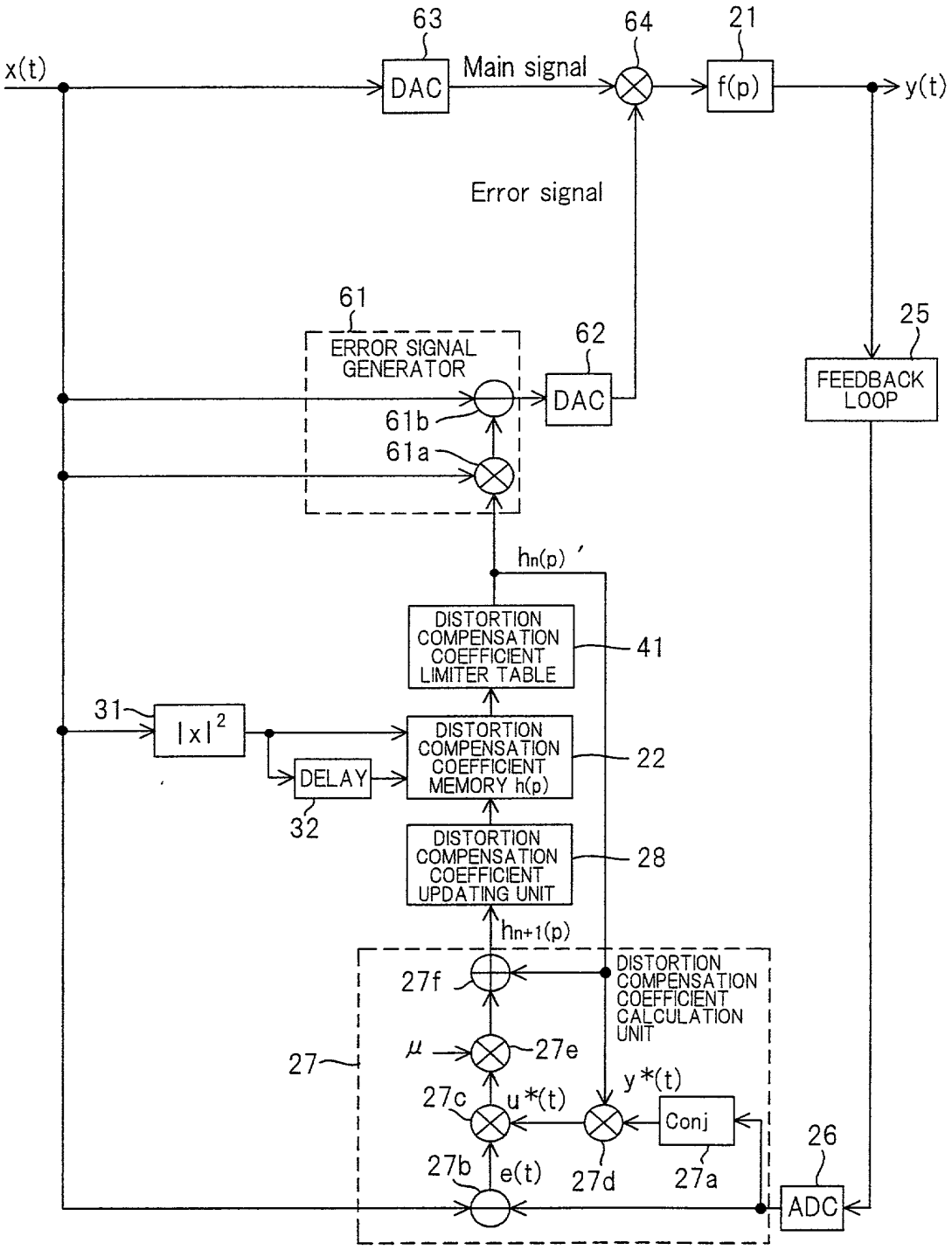
63
64
21
x(t)
DAC
Main signal
f(p)
y(t)
Error signal
61
ERROR SIGNAL GENERATOR
62
DAC
25
FEEDBACK LOOP
61b
61a
hn(p)'
DISTORTION COMPENSATION COEFFICIENT LIMITER TABLE
41
31
|x|2
DISTORTION COMPENSATION COEFFICIENT MEMORY h(p)
22
DELAY
32
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
28
hn+1(p)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27f
27
μ
27e
y*(t)
27c
u*(t)
Conj
26
27b
e(t)
27d
27a
ADC

FIG. 18

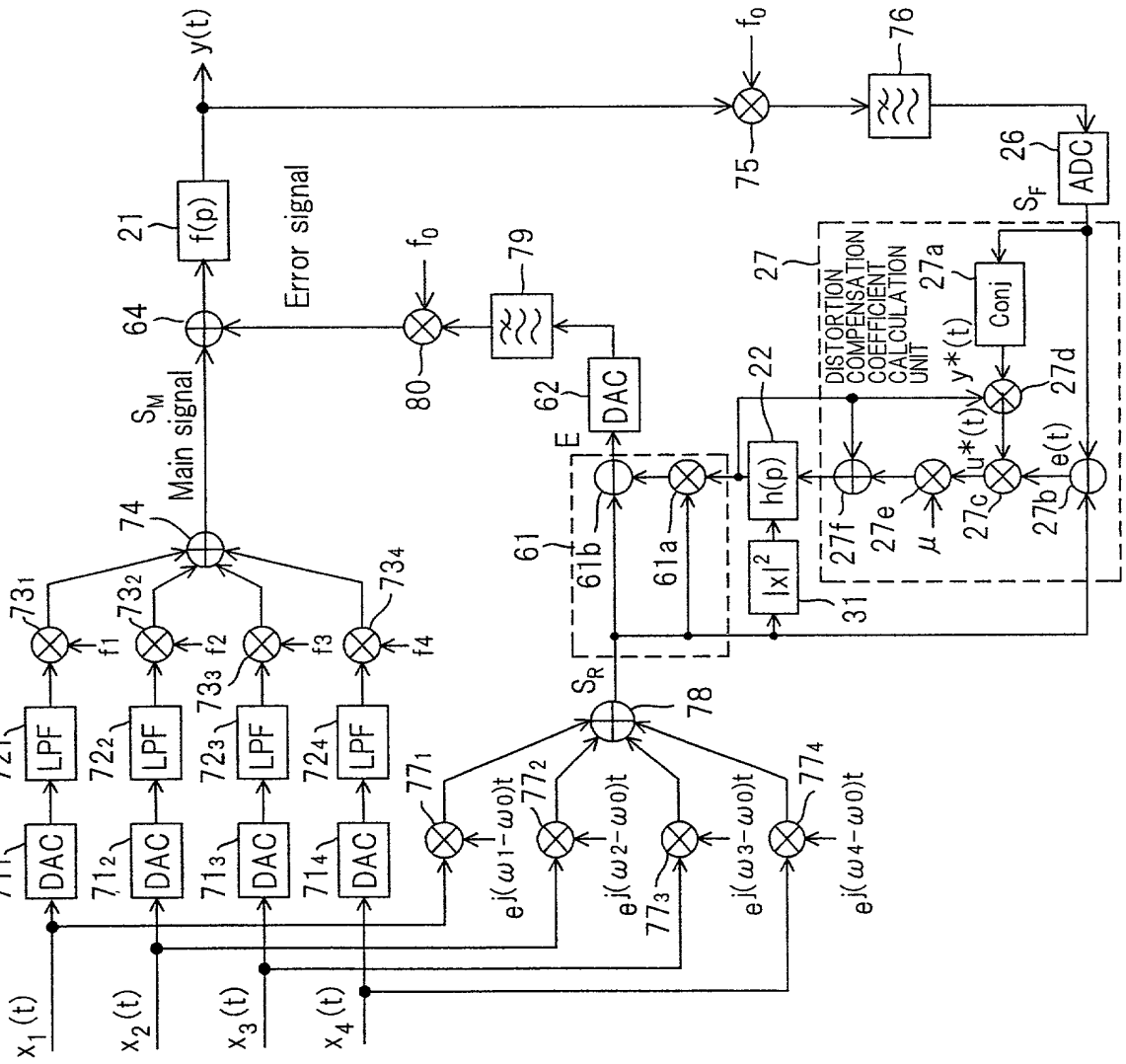
x1(t)
x2(t)
x3(t)
x4(t)
DAC
LPF
f1
f2
f3
f4
Main signal
Error signal
f(p)
y(t)
f0
ADC
Conj
h(p)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
E
e(t)
y*(t)
u*(t)
μ

FIG. 20

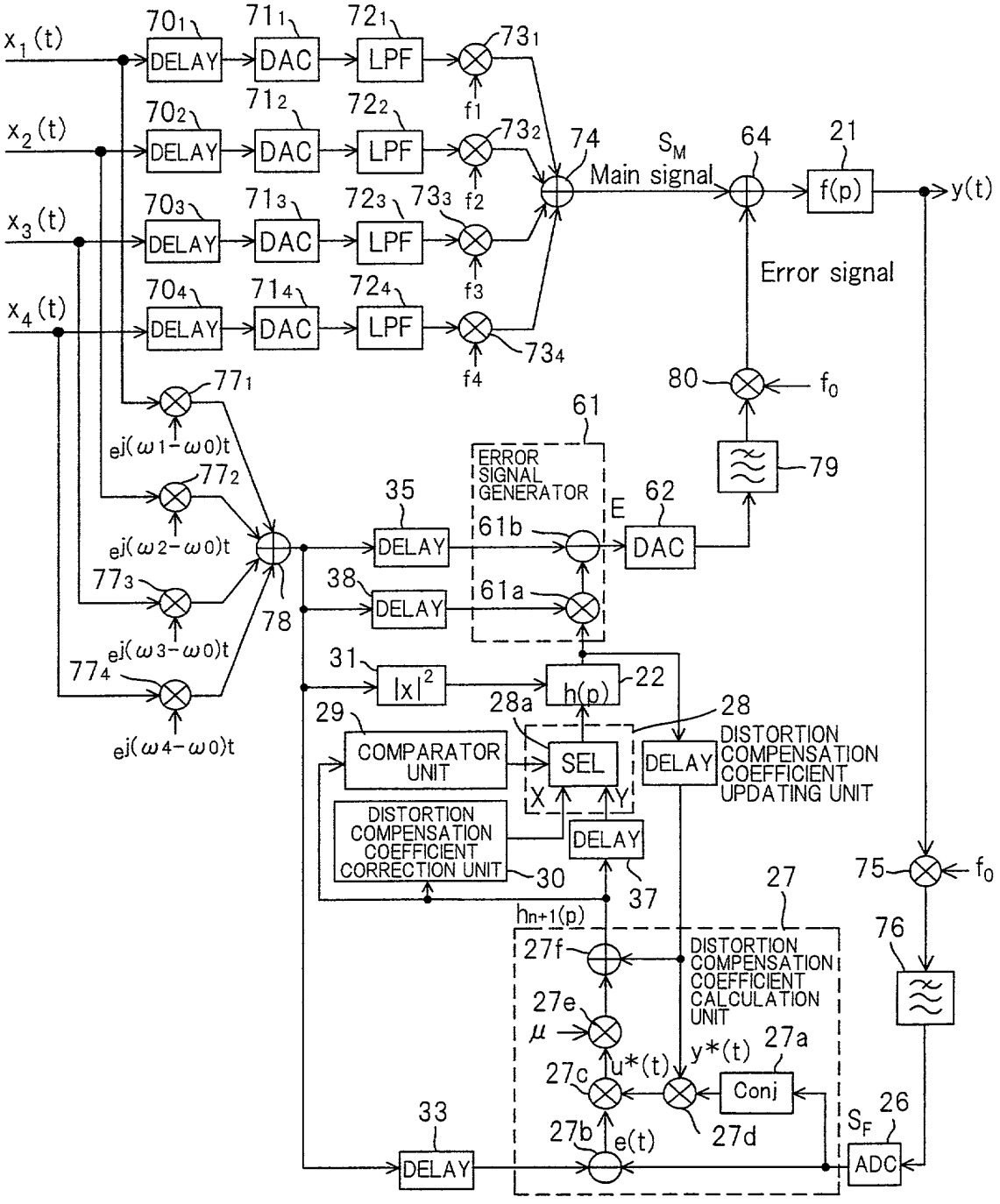
x1(t)
x2(t)
x3(t)
x4(t)
DELAY
DAC
LPF
f1
f2
f3
f4
74
Main signal
SM
64
21
f(p)
y(t)
Error signal
80
f0
79
61
ERROR SIGNAL GENERATOR
61b
61a
E
62
35
38
DELAY
78
31
|x|2
h(p)
22
28a
28
29
COMPARATOR UNIT
SEL
X
Y
DELAY
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
30
37
27
hn+1(p)
27f
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27e
μ
27c
u*(t)
y*(t)
27a
Conj
27d
27b
e(t)
33
SF
26
ADC
75
f0
76
ej(ω1−ω0)t
ej(ω2−ω0)t
ej(ω3−ω0)t
ej(ω4−ω0)t

FIG. 21

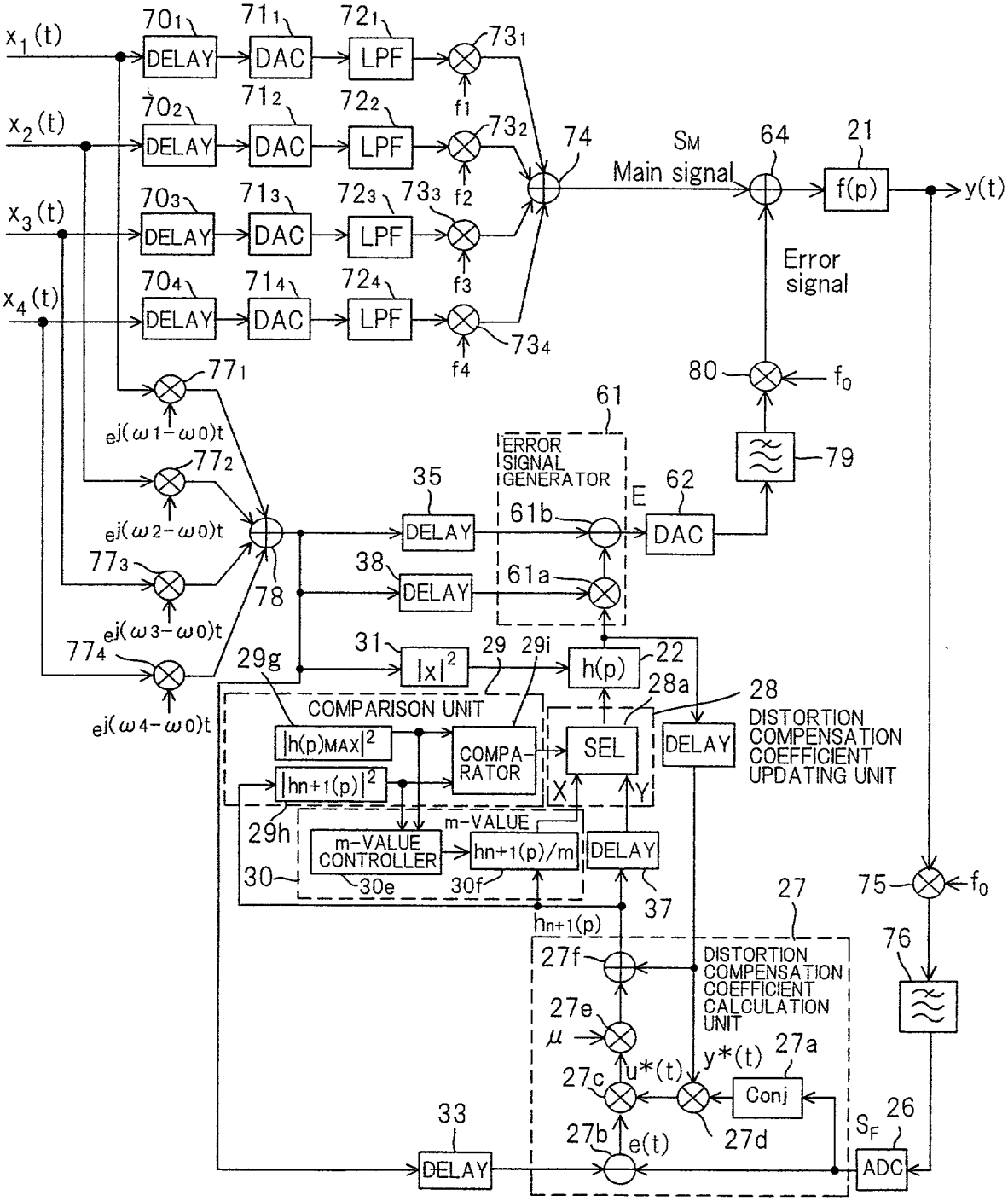
x1(t)
x2(t)
x3(t)
x4(t)
DELAY
DAC
LPF
f1
f2
f3
f4
74
SM
Main signal
64
21
f(p)
y(t)
Error signal
80
f0
79
61
ERROR SIGNAL GENERATOR
E
62
61b
61a
35
38
78
77
ej(ω1−ω0)t
ej(ω2−ω0)t
ej(ω3−ω0)t
ej(ω4−ω0)t
31
|x|2
29
29i
h(p)
22
28a
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
29g
COMPARISON UNIT
|h(p)MAX|2
|hn+1(p)|2
COMPA-RATOR
SEL
X
Y
m-VALUE
29h
m-VALUE CONTROLLER
hn+1(p)/m
30
30e
30f
37
hn+1(p)
27
75
f0
76
27f
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27e
μ
y*(t)
27a
27c
u*(t)
Conj
27d
27b
e(t)
33
SF
26
ADC

FIG. 22

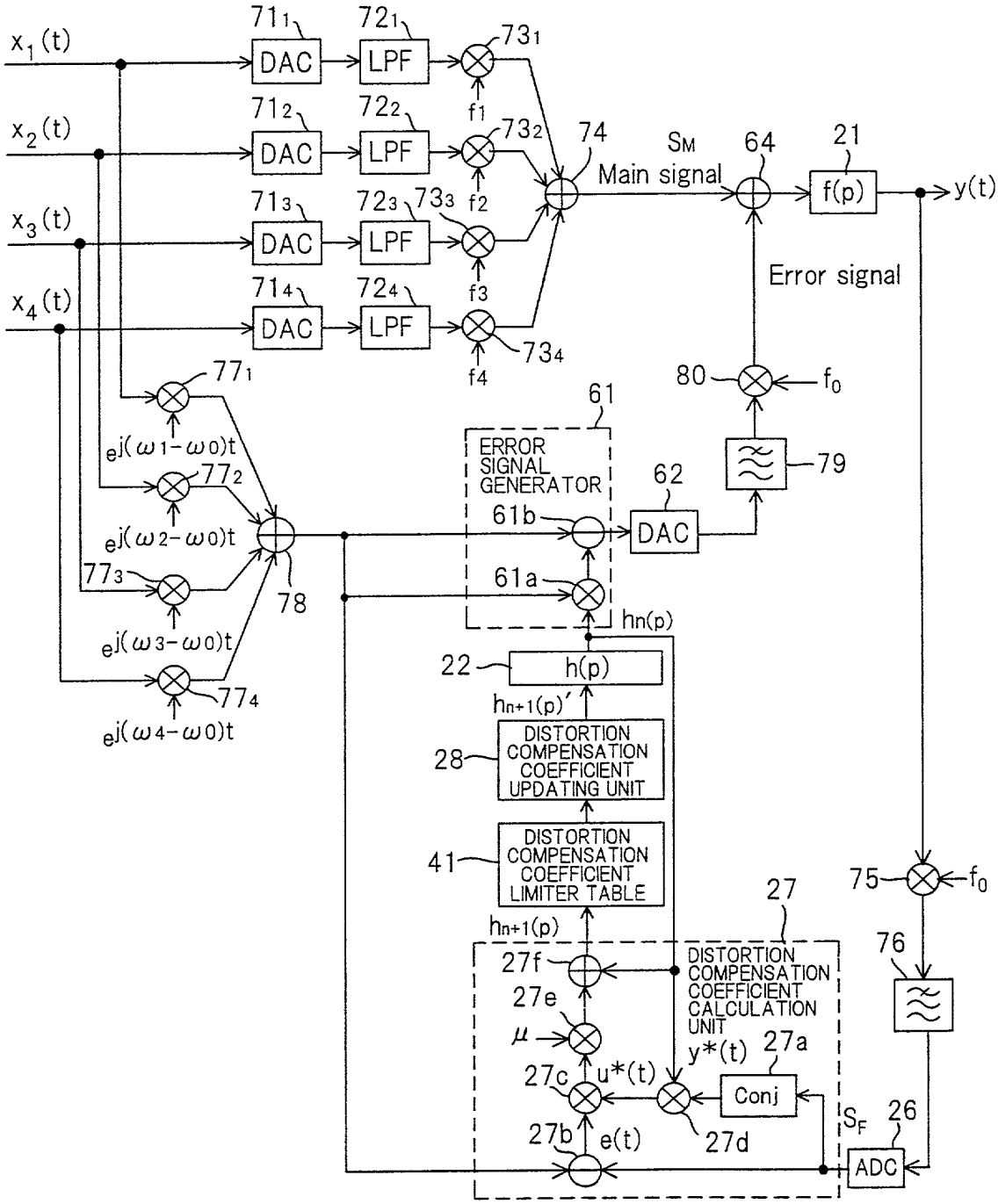
x1(t)
x2(t)
x3(t)
x4(t)
DAC
LPF
f1
f2
f3
f4
74
Main signal
SM
64
21
f(p)
y(t)
Error signal
80
f0
79
61
ERROR SIGNAL GENERATOR
61b
61a
62
DAC
77
ej(ω1−ω0)t
ej(ω2−ω0)t
ej(ω3−ω0)t
ej(ω4−ω0)t
78
hn(p)
22
h(p)
hn+1(p)′
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
41
DISTORTION COMPENSATION COEFFICIENT LIMITER TABLE
27
hn+1(p)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27f
27e
μ
27c
u*(t)
y*(t)
27a
Conj
27b
e(t)
27d
SF
26
ADC
75
f0
76

FIG. 23

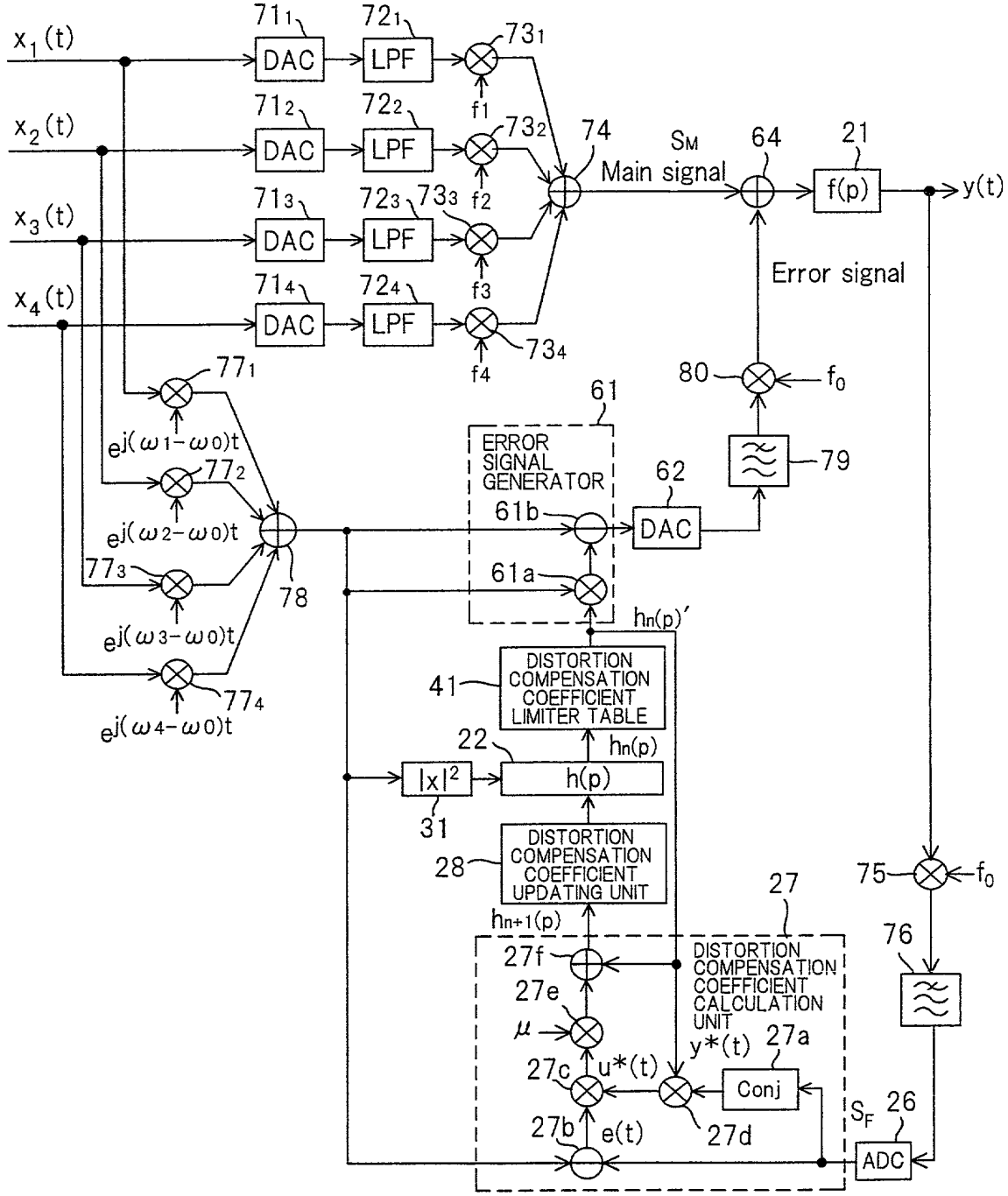
x1(t)
x2(t)
x3(t)
x4(t)
DAC
LPF
f1
f2
f3
f4
74
Main signal
SM
64
21
f(p)
y(t)
Error signal
80
f0
79
61
ERROR SIGNAL GENERATOR
61b
61a
62
DAC
77
78
ej(ω1−ω0)t
ej(ω2−ω0)t
ej(ω3−ω0)t
ej(ω4−ω0)t
hn(p)'
41
DISTORTION COMPENSATION COEFFICIENT LIMITER TABLE
22
hn(p)
|x|2
31
h(p)
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
hn+1(p)
27
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27f
27e
μ
27c
u*(t)
y*(t)
27a
Conj
27b
e(t)
27d
SF
26
ADC
75
76

FIG. 24

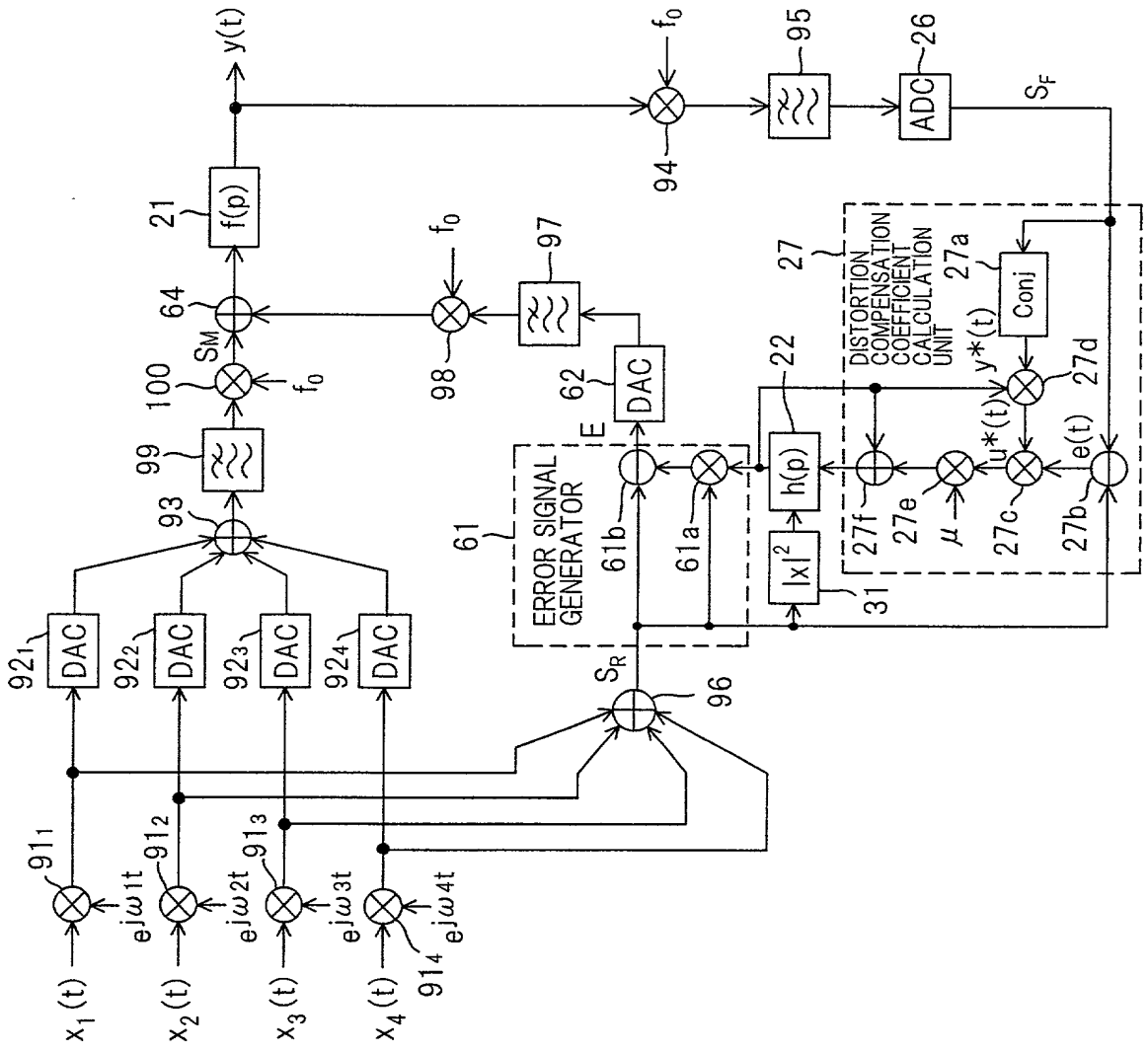
x1(t)
x2(t)
x3(t)
x4(t)
911
912
913
914
ejω1t
ejω2t
ejω3t
ejω4t
921
922
923
924
DAC
93
99
100
SM
64
f0
21
f(p)
y(t)
98
97
62
E
61
ERROR SIGNAL GENERATOR
61b
61a
SR
96
22
h(p)
|x|2
31
27
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27a
Conj
y*(t)
27d
27f
27e
μ
27c
u*(t)
e(t)
27b
94
95
ADC
26
SF

FIG. 25

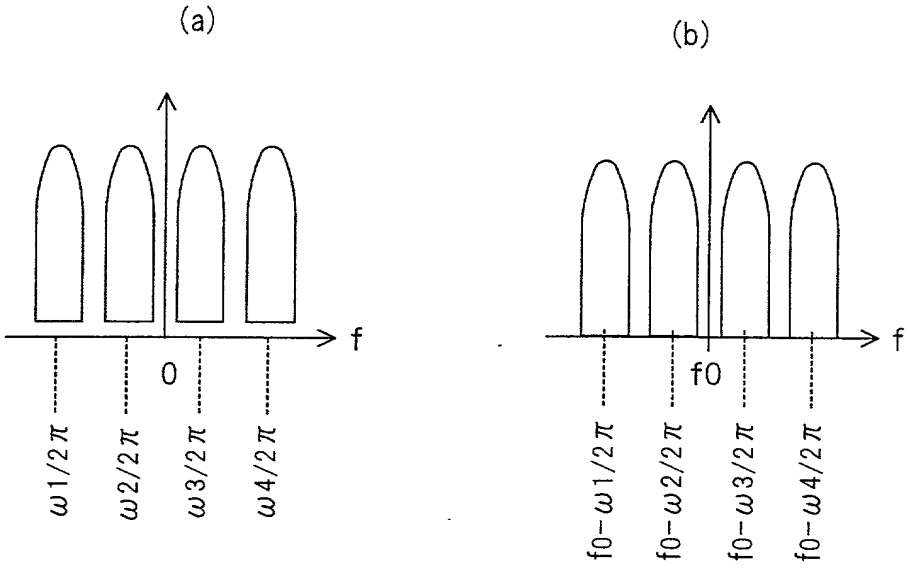
(a)
(b)
f
0
ω1/2π
ω2/2π
ω3/2π
ω4/2π
f
f0
f0-ω1/2π
f0-ω2/2π
f0-ω3/2π
f0-ω4/2π

FIG. 40

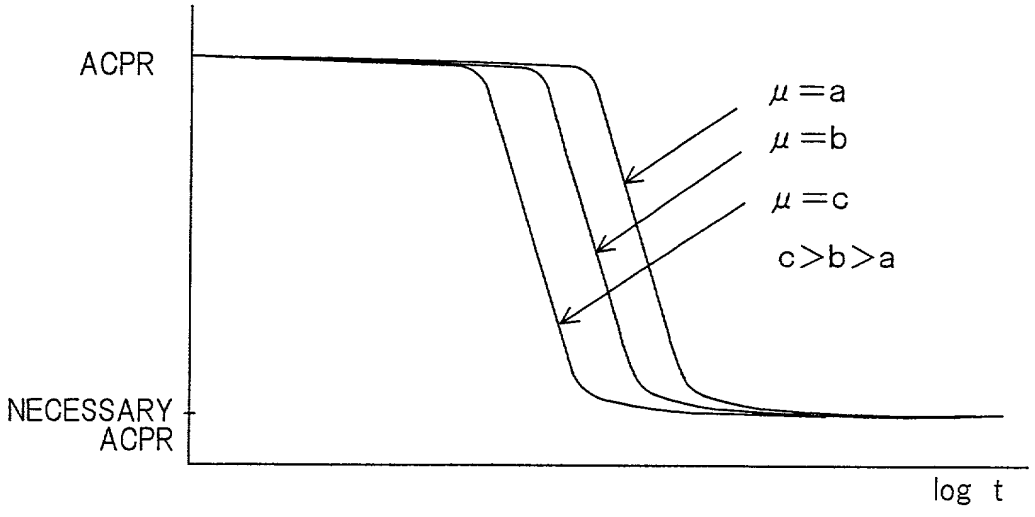
ACPR
μ=a
μ=b
μ=c
c>b>a
NECESSARY ACPR
log t

FIG. 26

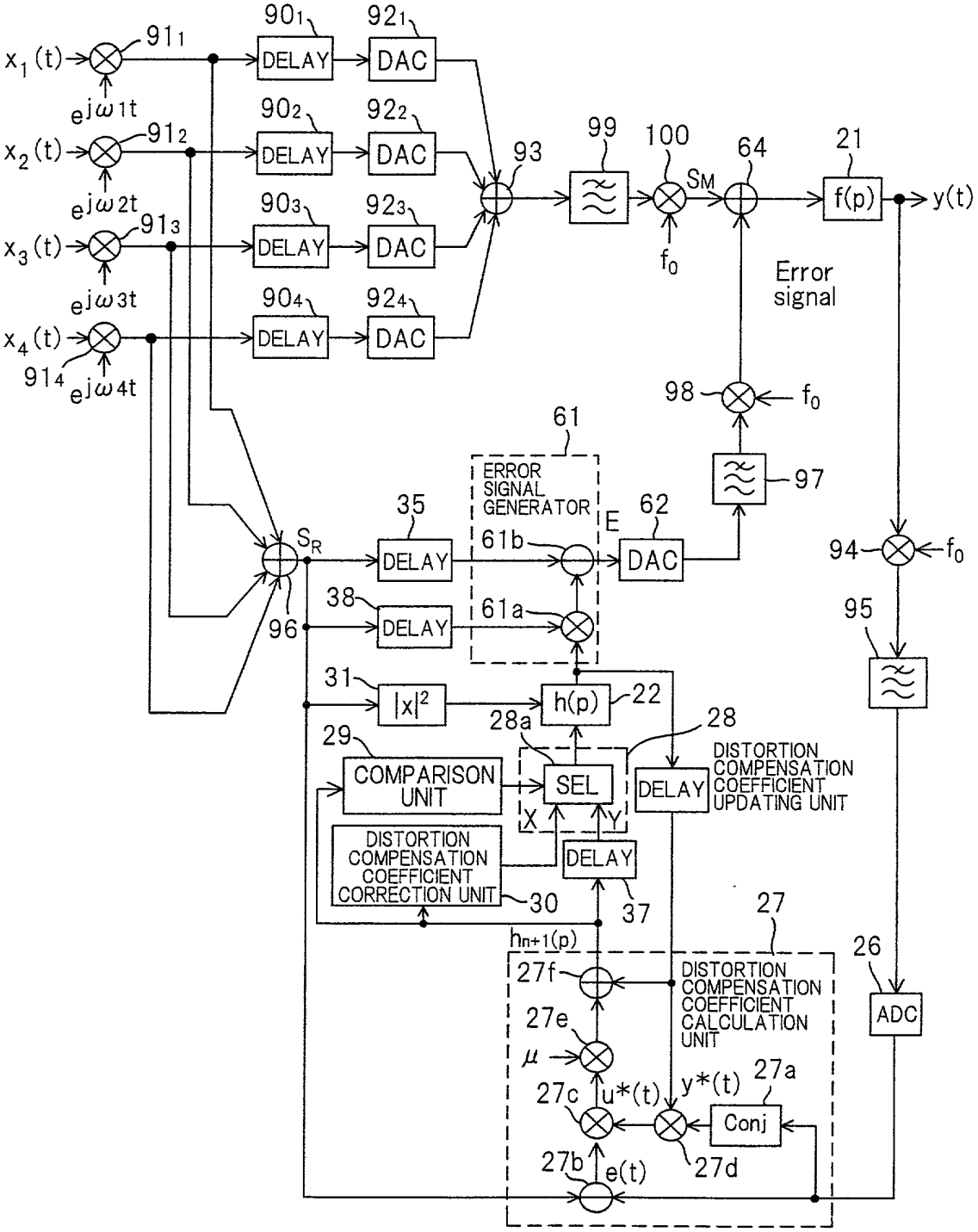
x1(t)
x2(t)
x3(t)
x4(t)
ejω1t
ejω2t
ejω3t
ejω4t
911
912
913
914
901
902
903
904
921
922
923
924
DELAY
DAC
93
99
100
SM
64
21
f(p)
y(t)
f0
Error signal
98
97
61
ERROR SIGNAL GENERATOR
61b
61a
E
62
35
SR
96
38
31
|x|2
h(p)
22
28a
28
29
COMPARISON UNIT
SEL
X
Y
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
DISTORTION COMPENSATION COEFFICIENT CORRECTION UNIT
30
37
27
hn+1(p)
27f
27e
μ
27c
u*(t)
y*(t)
27a
Conj
27d
27b
e(t)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
94
95
26
ADC

FIG. 27

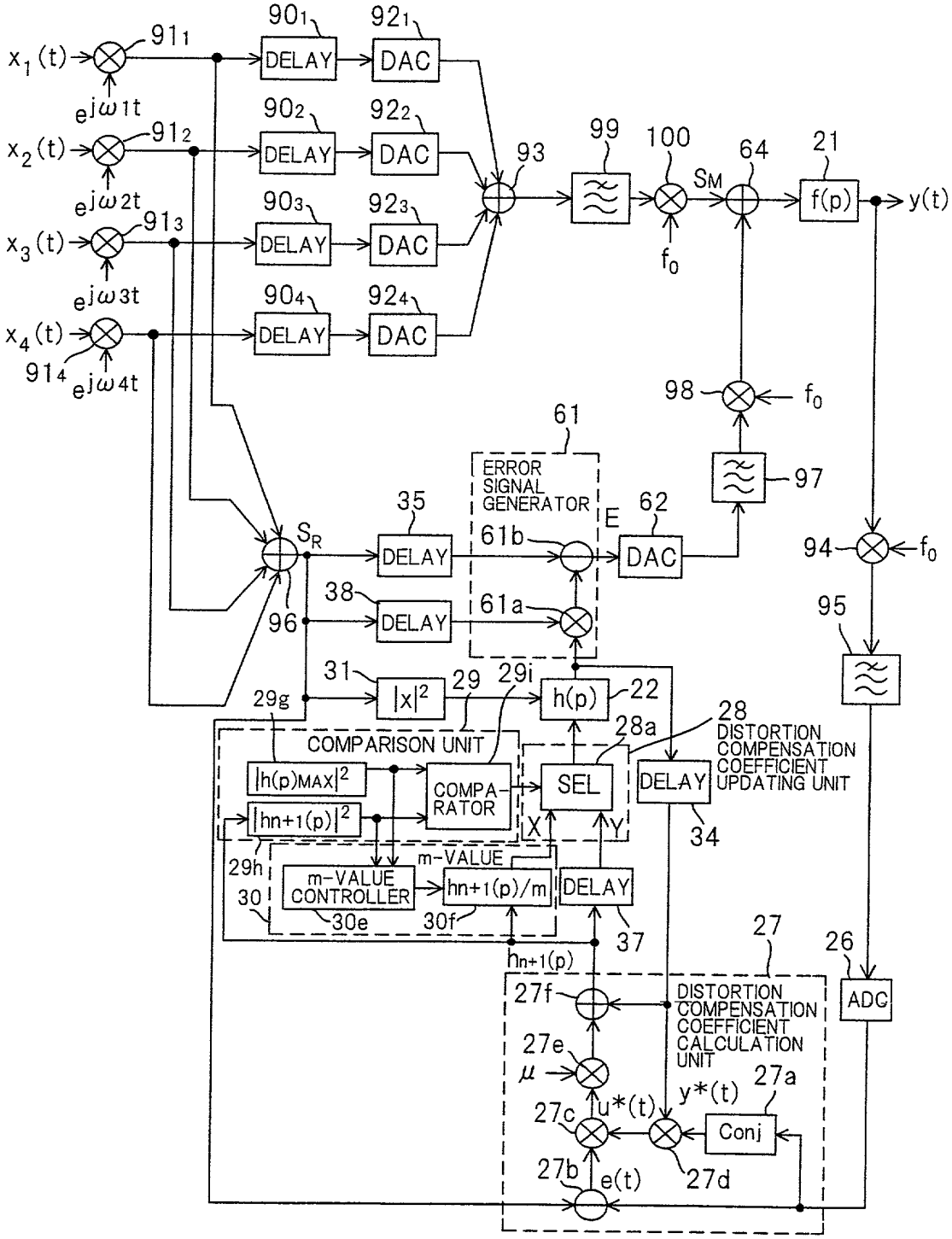
x1(t)
x2(t)
x3(t)
x4(t)
ejω1t
ejω2t
ejω3t
ejω4t
911
912
913
914
901
902
903
904
921
922
923
924
DELAY
DAC
93
99
100
64
21
f(p)
y(t)
SM
f0
98
97
94
95
96
SR
35
38
61
ERROR SIGNAL GENERATOR
61b
61a
E
62
31
|x|2
29
29i
h(p)
22
29g
28
28a
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
COMPARISON UNIT
|h(p)MAX|2
|hn+1(p)|2
COMPARATOR
SEL
X
Y
34
m-VALUE
29h
30
m-VALUE CONTROLLER
30e
hn+1(p)/m
30f
37
hn+1(p)
27
26
ADC
27f
27e
μ
27c
27b
e(t)
u*(t)
y*(t)
27a
Conj
27d
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT

FIG. 28

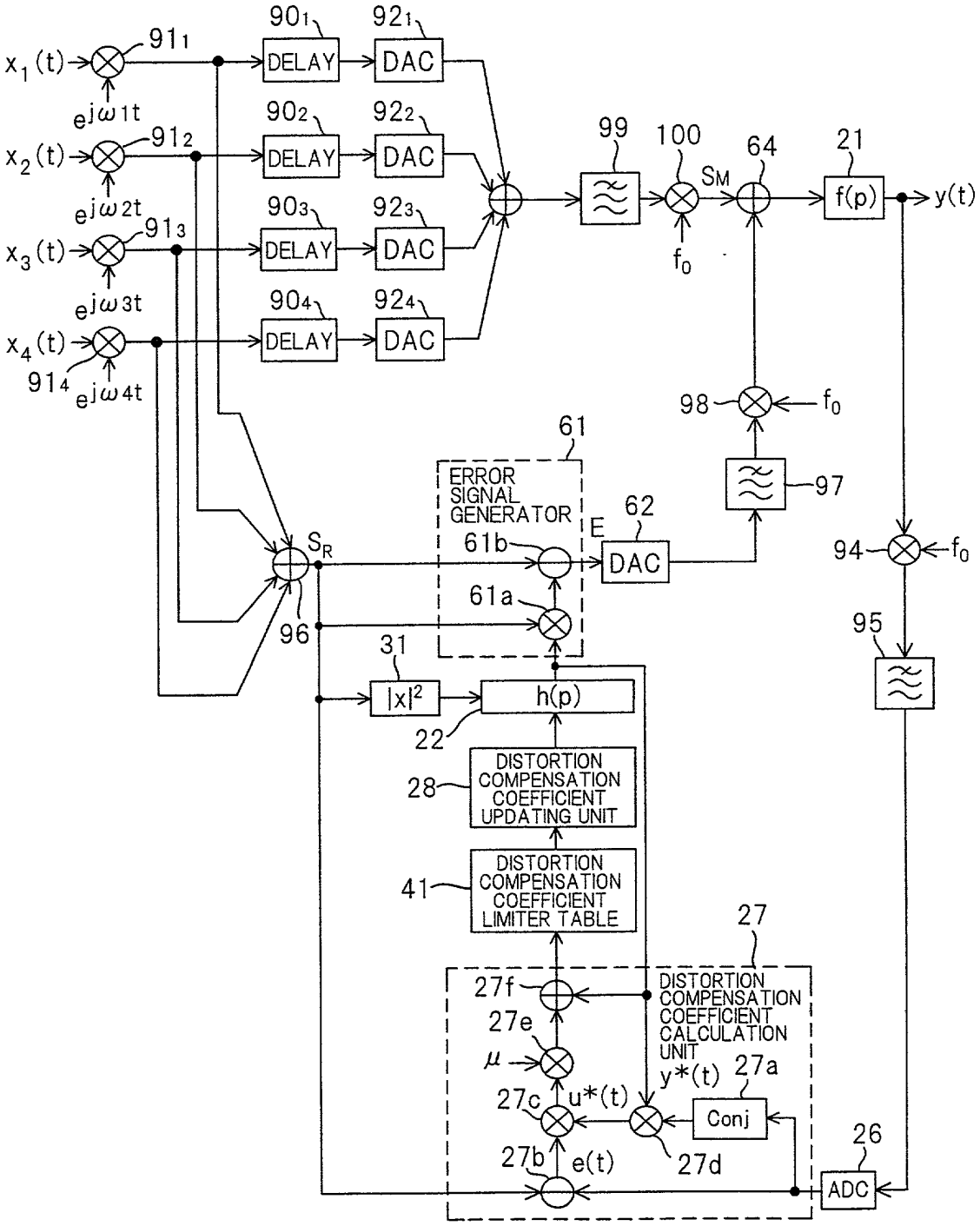
x1(t)
x2(t)
x3(t)
x4(t)
ejω1t
ejω2t
ejω3t
ejω4t
911
912
913
914
901
902
903
904
DELAY
921
922
923
924
DAC
99
100
SM
64
21
f(p)
y(t)
f0
98
97
61
ERROR SIGNAL GENERATOR
61b
61a
62
E
SR
96
94
95
31
|x|2
h(p)
22
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
41
DISTORTION COMPENSATION COEFFICIENT LIMITER TABLE
27
27f
27e
μ
27c
u*(t)
27b
e(t)
27d
y*(t)
27a
Conj
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
26
ADC

FIG. 29

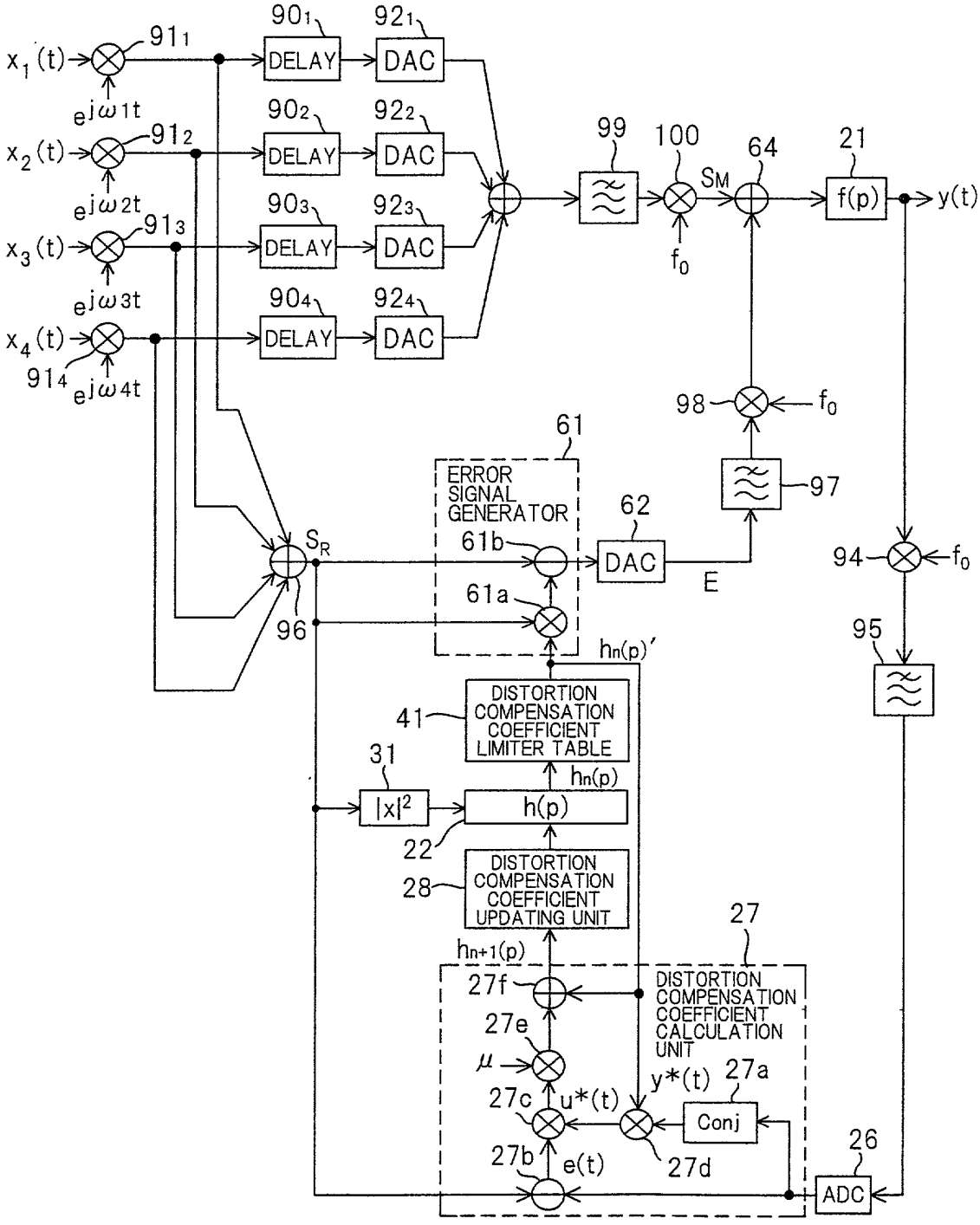
x1(t)
x2(t)
x3(t)
x4(t)
ejω1t
ejω2t
ejω3t
ejω4t
911
912
913
914
901
902
903
904
DELAY
921
922
923
924
DAC
99
100
SM
64
21
f(p)
y(t)
f0
98
97
61
ERROR SIGNAL GENERATOR
61b
61a
62
DAC
E
SR
96
94
95
hn(p)'
41
DISTORTION COMPENSATION COEFFICIENT LIMITER TABLE
31
|x|2
hn(p)
h(p)
22
28
DISTORTION COMPENSATION COEFFICIENT UPDATING UNIT
27
hn+1(p)
27f
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27e
μ
y*(t)
27a
27c
u*(t)
Conj
27b
e(t)
27d
26
ADC

FIG. 30

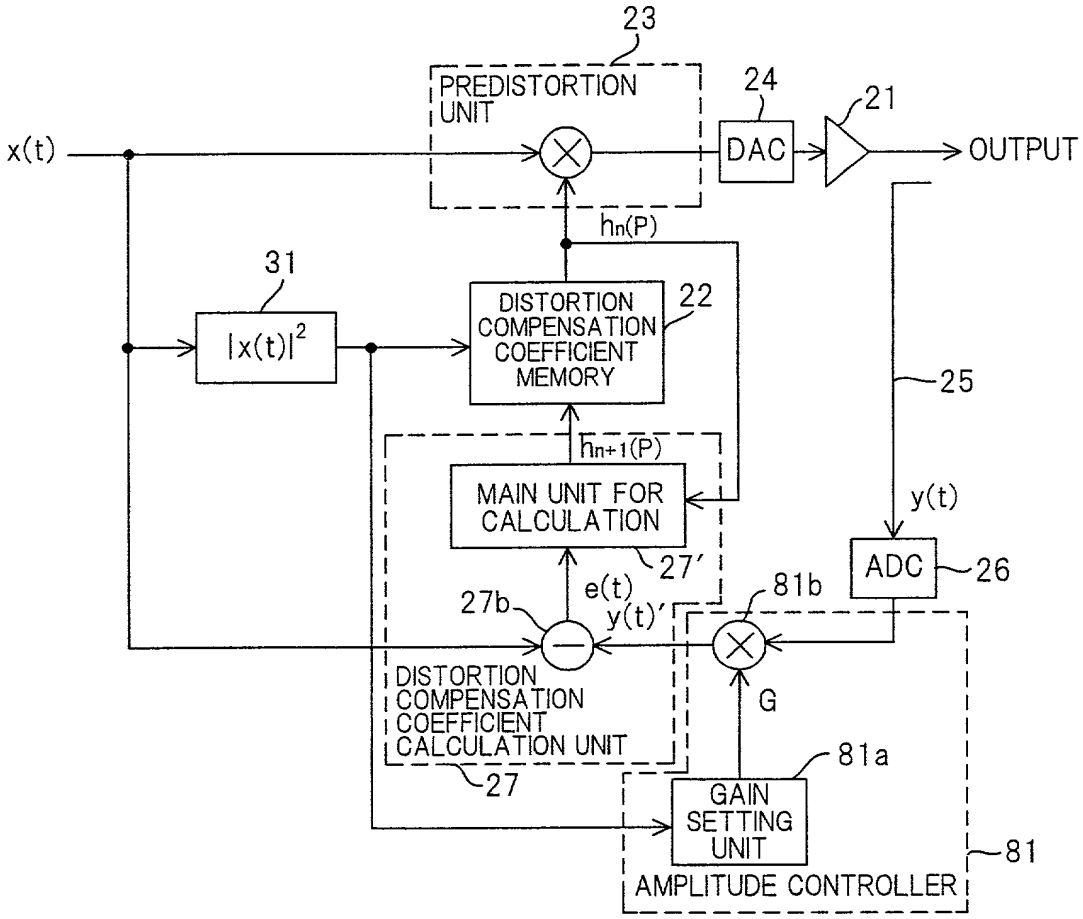
23
PREDISTORTION UNIT
24
DAC
21
OUTPUT
x(t)
hn(P)
31
|x(t)|2
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
25
hn+1(P)
MAIN UNIT FOR CALCULATION
27'
y(t)
ADC
26
e(t)
y(t)'
27b
81b
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
G
81a
GAIN SETTING UNIT
81
AMPLITUDE CONTROLLER

FIG. 31A

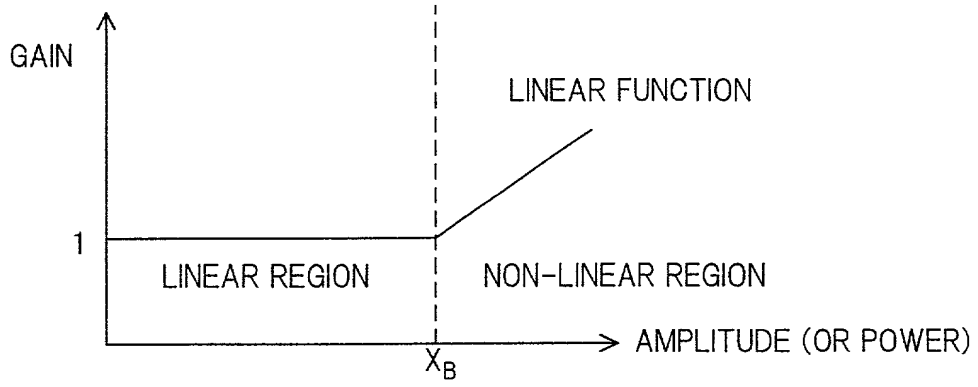

FIG. 31B

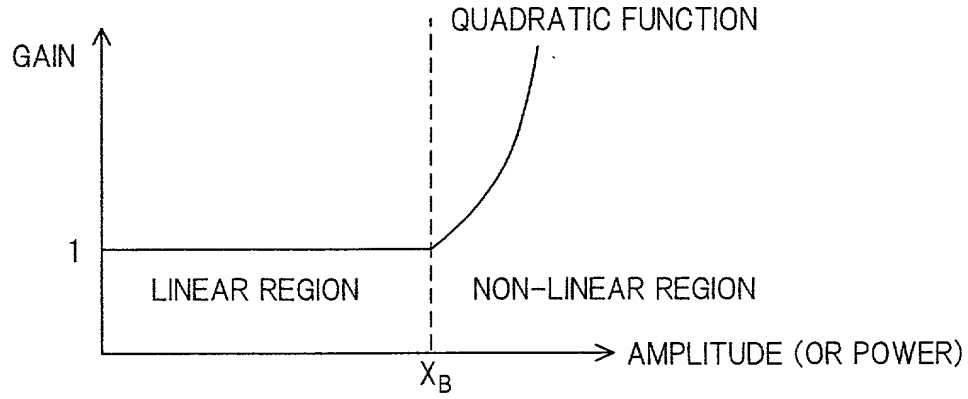

FIG. 31C

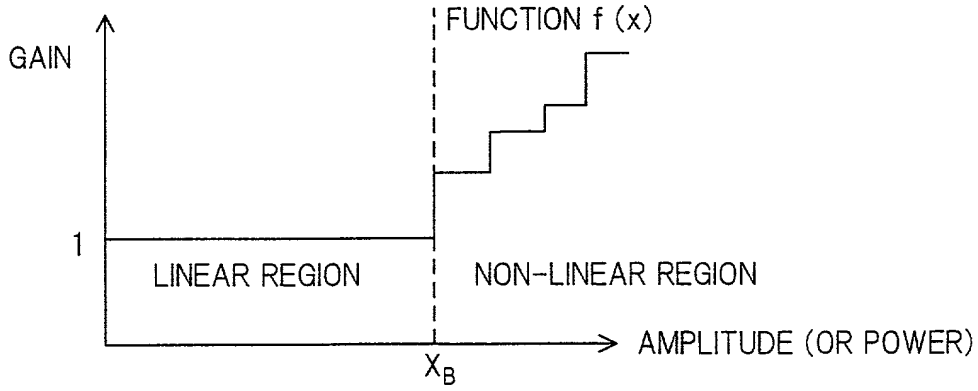

FIG. 32

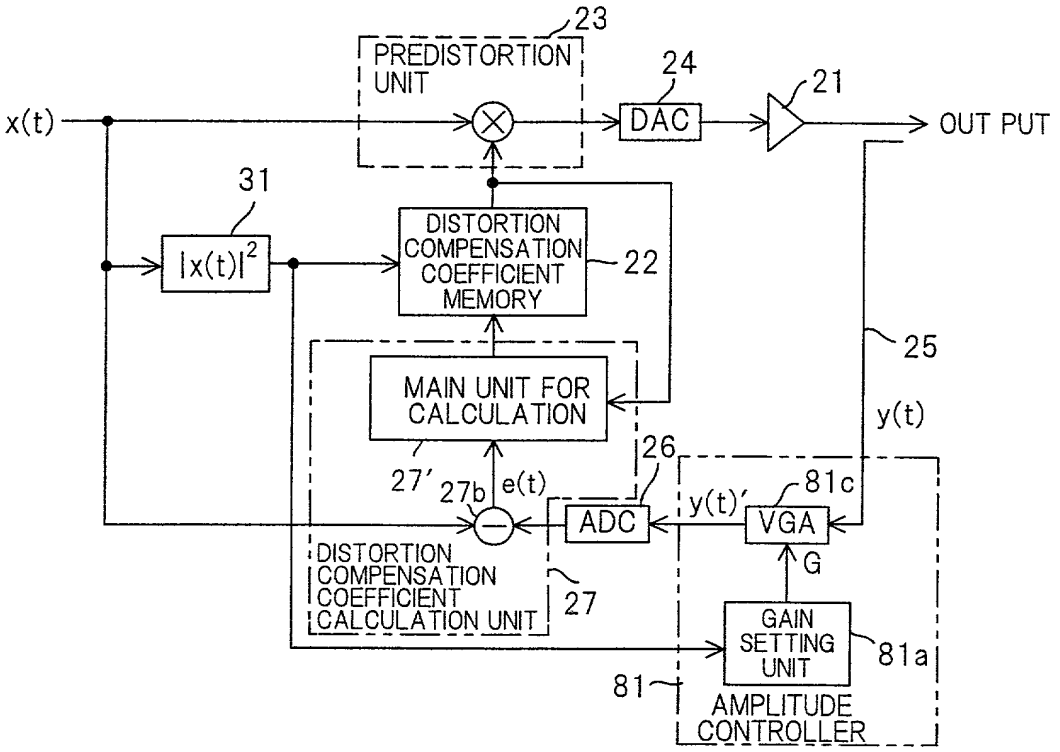
23
PREDISTORTION UNIT
24
DAC
21
x(t)
OUT PUT
31
$|x(t)|^2$
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
25
MAIN UNIT FOR CALCULATION
y(t)
26
27'
27b
e(t)
ADC
y(t)'
81c
VGA
G
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
GAIN SETTING UNIT
81a
81
AMPLITUDE CONTROLLER

FIG. 33

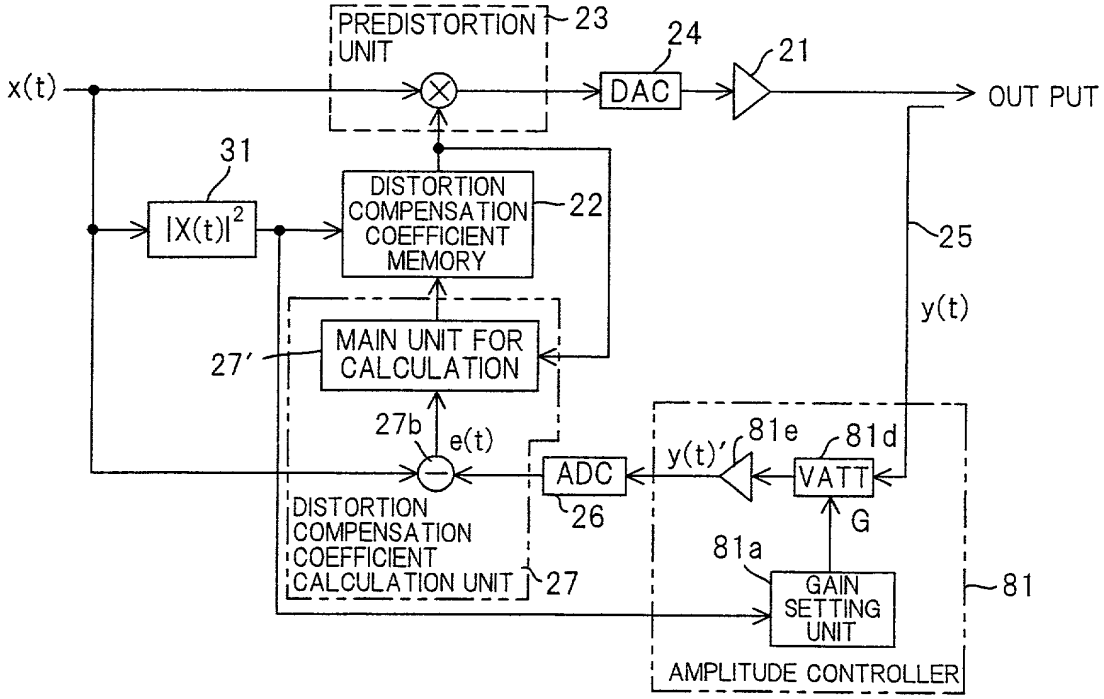
PREDISTORTION UNIT
23
24
DAC
21
x(t)
OUT PUT
31
$|X(t)|^2$
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
25
y(t)
MAIN UNIT FOR CALCULATION
27'
27b
e(t)
81e
81d
y(t)'
ADC
VATT
26
G
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
81a
GAIN SETTING UNIT
81
AMPLITUDE CONTROLLER

FIG. 34

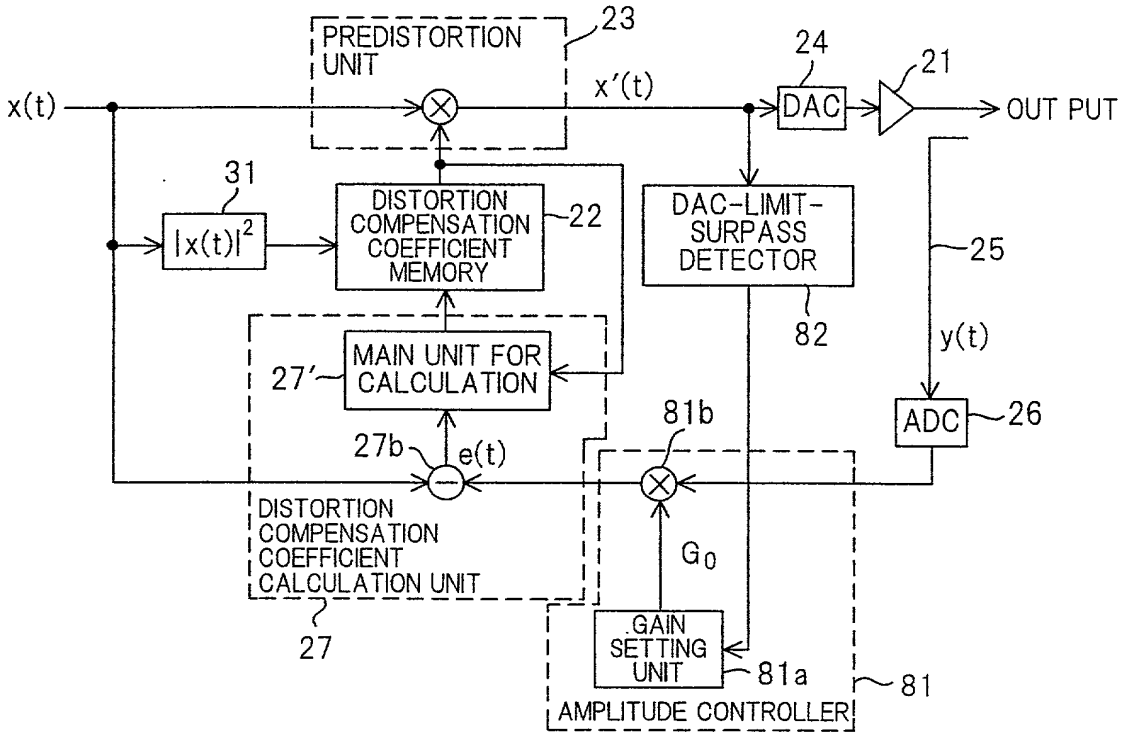
PREDISTORTION UNIT
23
x(t)
x'(t)
24
DAC
21
OUT PUT
31
$|x(t)|^2$
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
DAC-LIMIT-SURPASS DETECTOR
82
25
y(t)
27'
MAIN UNIT FOR CALCULATION
ADC
26
81b
27b
e(t)
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
G_0
GAIN SETTING UNIT
81a
81
AMPLITUDE CONTROLLER

FIG. 35

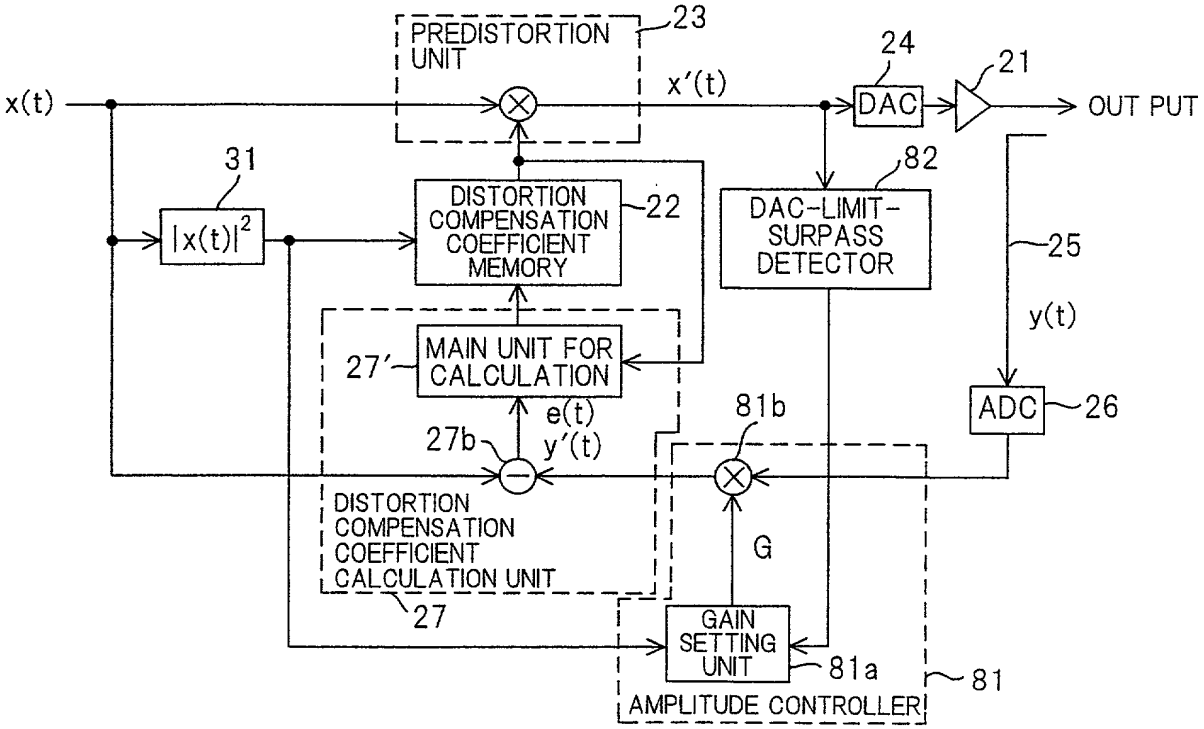
PREDISTORTION UNIT
23
x(t)
x'(t)
24
DAC
21
OUT PUT
31
$|x(t)|^2$
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
82
DAC-LIMIT-SURPASS DETECTOR
25
y(t)
27'
MAIN UNIT FOR CALCULATION
e(t)
y'(t)
27b
81b
ADC
26
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
G
GAIN SETTING UNIT
81a
81
AMPLITUDE CONTROLLER

FIG. 36

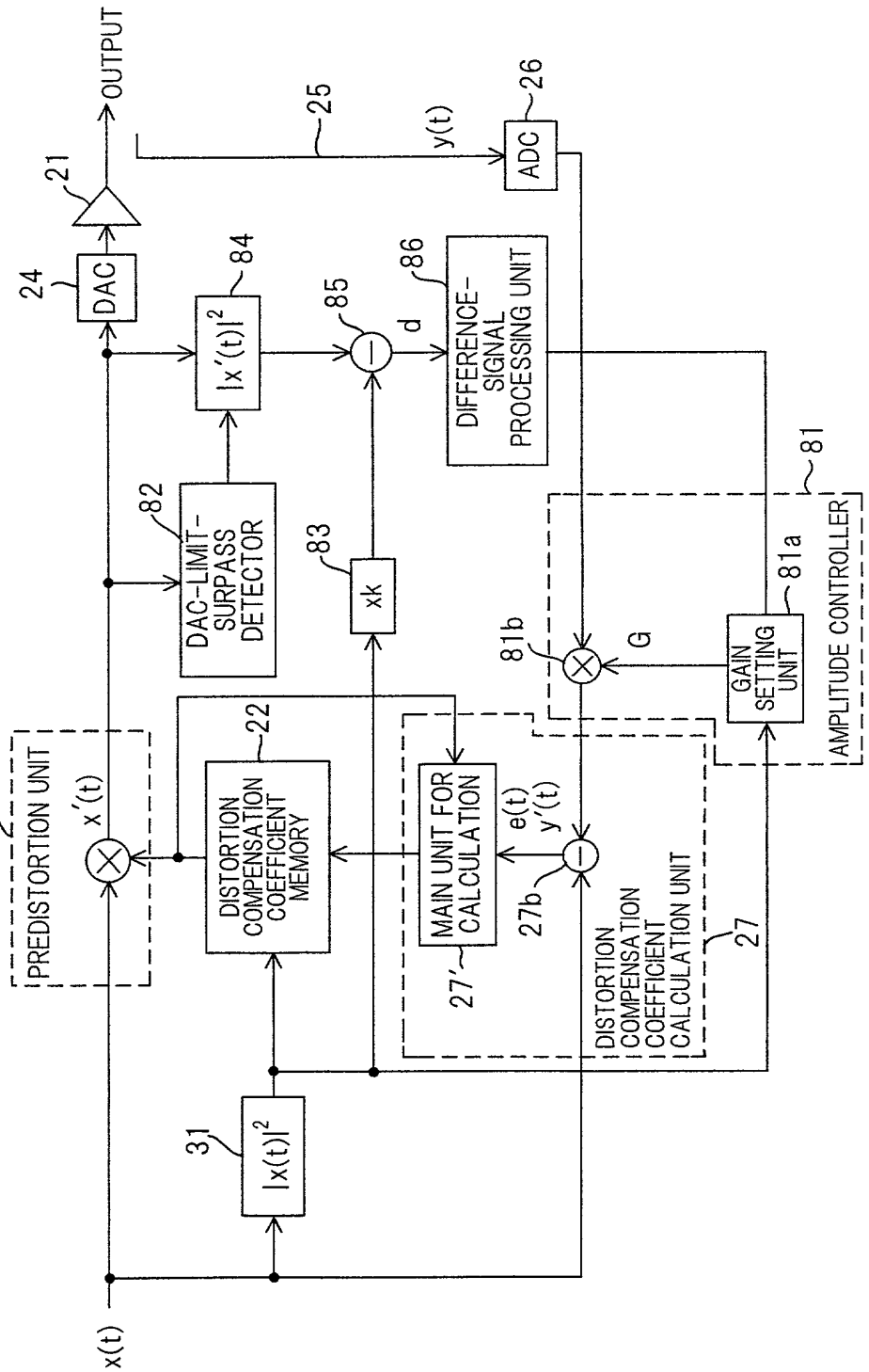
x(t)
31
$|x(t)|^2$
PREDISTORTION UNIT
23
x'(t)
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
MAIN UNIT FOR CALCULATION
27'
e(t)
y'(t)
27b
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
DAC-LIMIT-SURPASS DETECTOR
82
xk
83
$|x'(t)|^2$
84
85
d
DIFFERENCE-SIGNAL PROCESSING UNIT
86
24
DAC
21
OUTPUT
25
y(t)
ADC
26
81b
G
GAIN SETTING UNIT
81a
AMPLITUDE CONTROLLER
81

FIG. 37

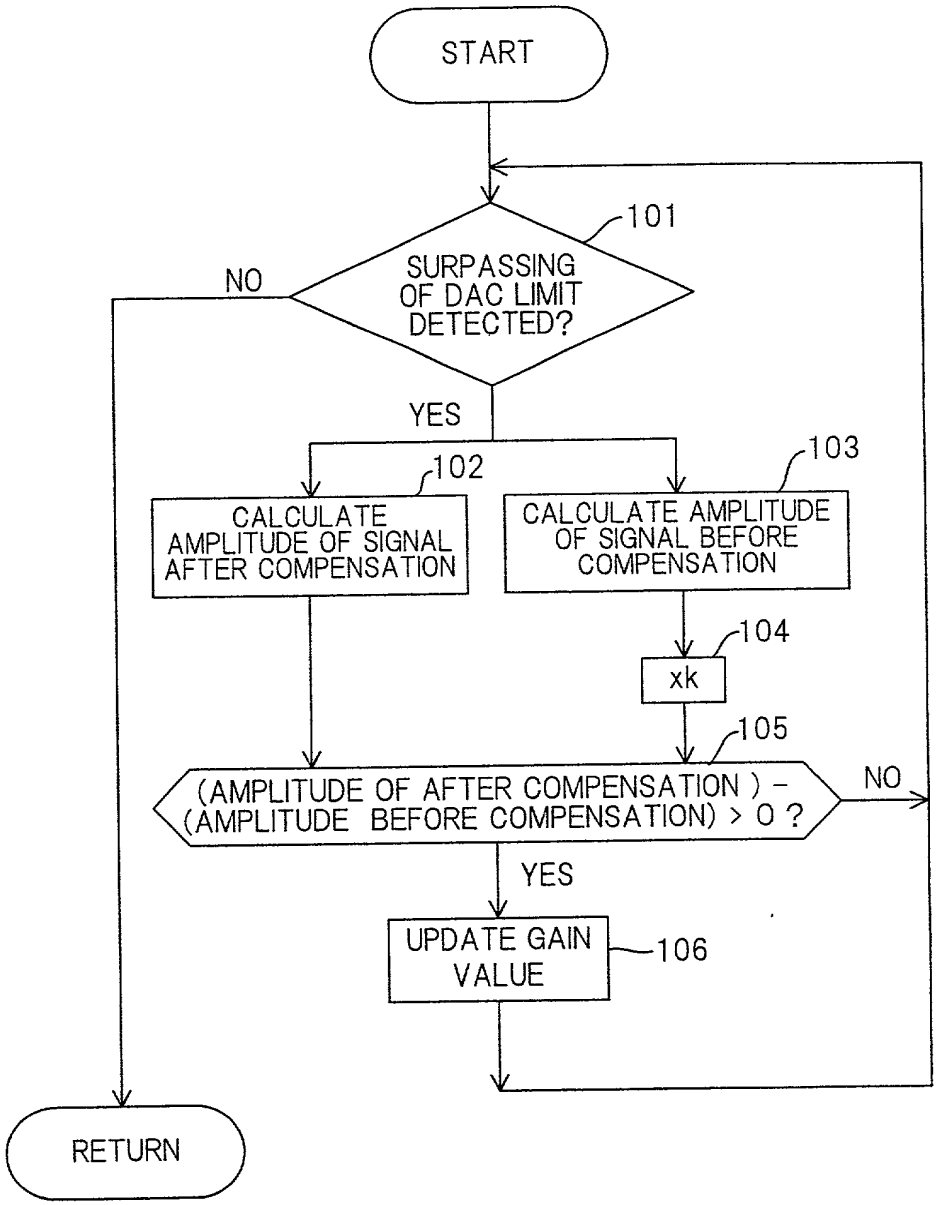
START
101
SURPASSING OF DAC LIMIT DETECTED?
NO
YES
102
CALCULATE AMPLITUDE OF SIGNAL AFTER COMPENSATION
103
CALCULATE AMPLITUDE OF SIGNAL BEFORE COMPENSATION
104
xk
105
(AMPLITUDE OF AFTER COMPENSATION) - (AMPLITUDE BEFORE COMPENSATION) > 0 ?
NO
YES
UPDATE GAIN VALUE
106
RETURN

FIG. 38

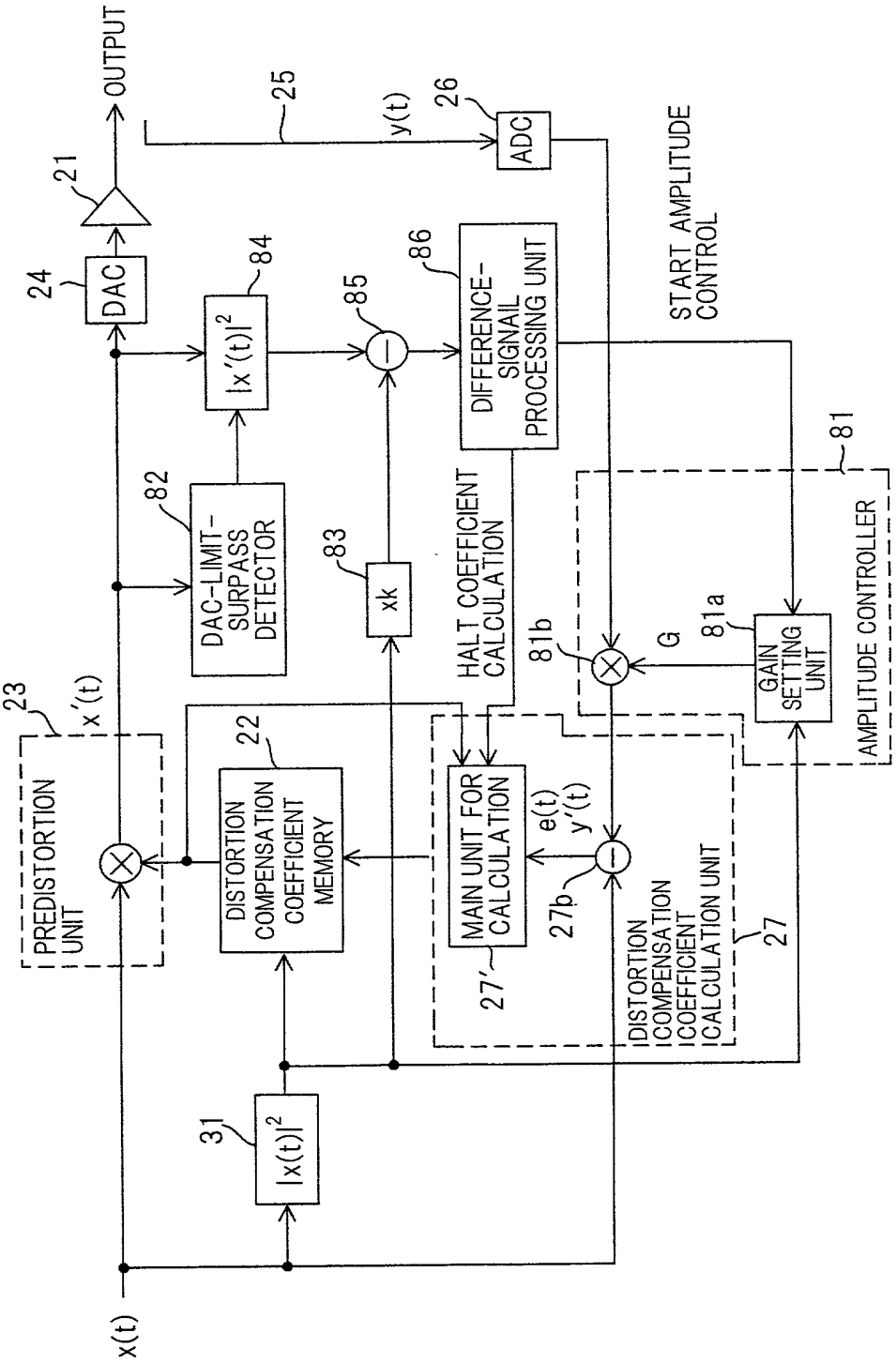
x(t)
PREDISTORTION UNIT
23
x'(t)
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
DAC
24
21
OUTPUT
25
y(t)
26
ADC
$|x(t)|^2$
31
$|x'(t)|^2$
84
DAC-LIMIT-SURPASS DETECTOR
82
xk
83
85
86
DIFFERENCE-SIGNAL PROCESSING UNIT
START AMPLITUDE CONTROL
HALT COEFFICIENT CALCULATION
81b
G
81a
GAIN SETTING UNIT
81
AMPLITUDE CONTROLLER
MAIN UNIT FOR CALCULATION
27'
e(t)
y'(t)
27b
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27

FIG. 39

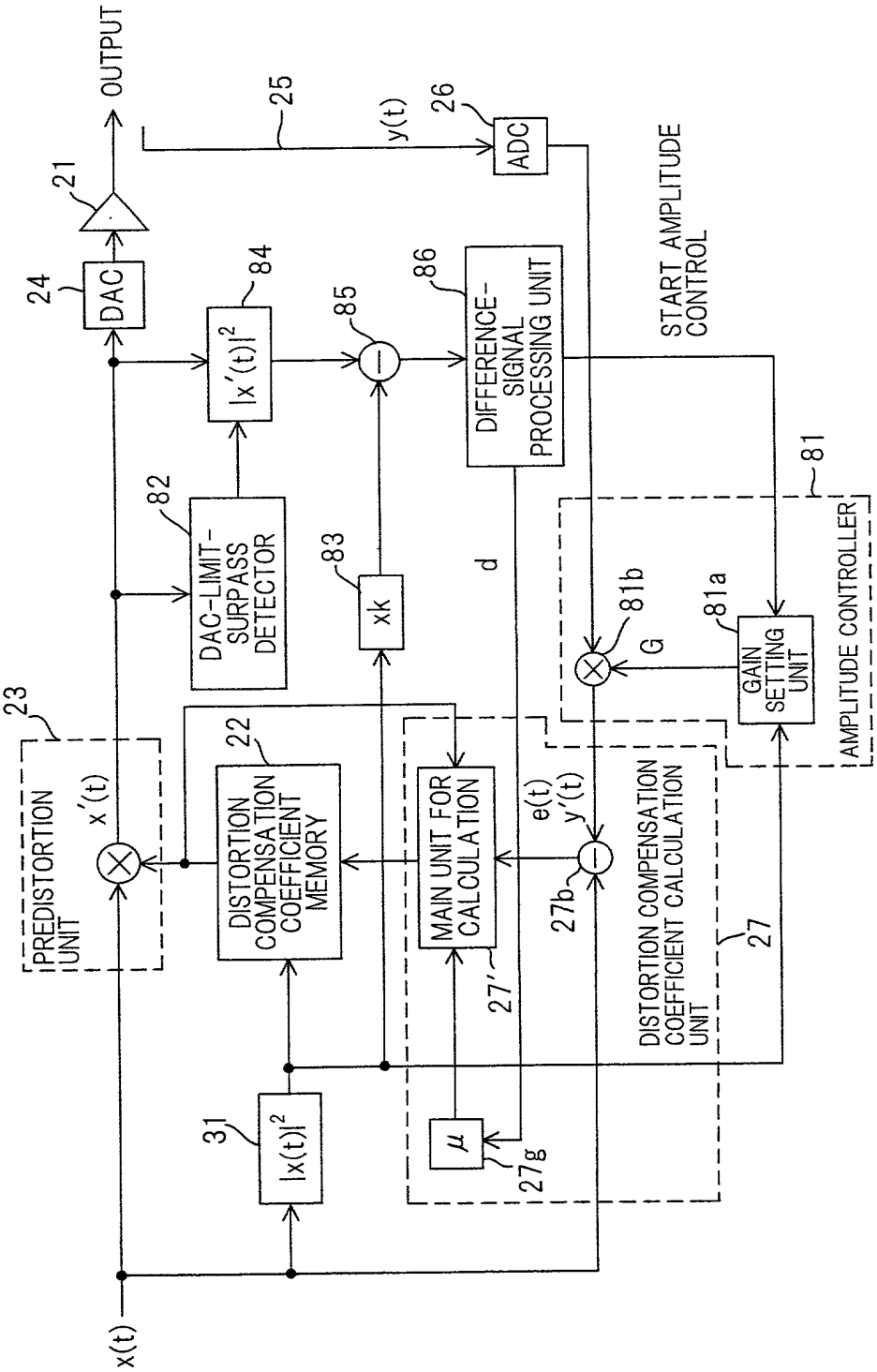
OUTPUT
21
24
DAC
25
y(t)
26
ADC
START AMPLITUDE CONTROL
84
$|x'(t)|^2$
85
86
DIFFERENCE-SIGNAL PROCESSING UNIT
82
DAC-LIMIT-SURPASS DETECTOR
83
xk
d
81
81b
G
81a
GAIN SETTING UNIT
AMPLITUDE CONTROLLER
23
PREDISTORTION UNIT
x'(t)
22
DISTORTION COMPENSATION COEFFICIENT MEMORY
MAIN UNIT FOR CALCULATION
e(t)
y'(t)
27b
27'
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
31
$|x(t)|^2$
μ
27g
x(t)

FIG. 41

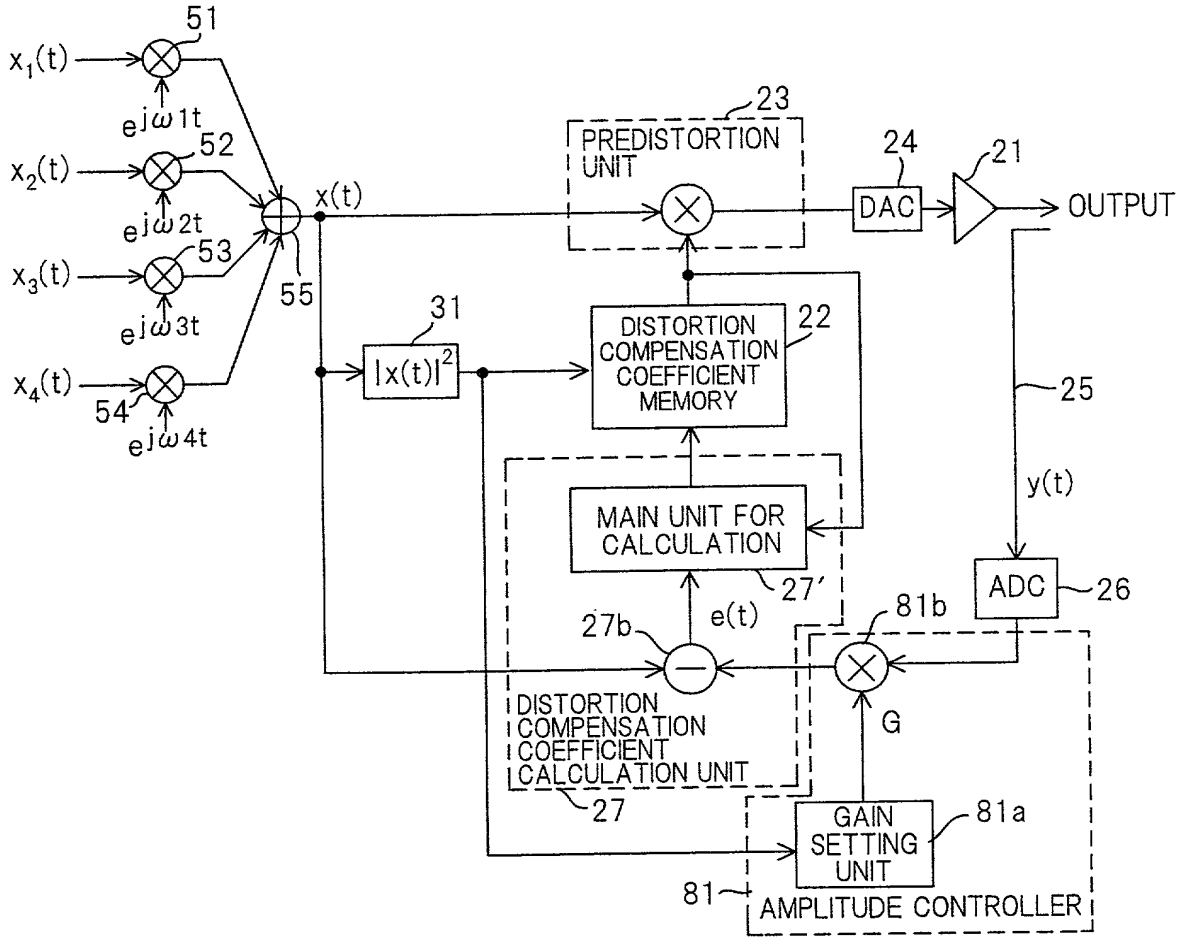
51
$x_1(t)$
$e^{j\omega 1t}$
52
$x_2(t)$
$e^{j\omega 2t}$
53
$x_3(t)$
$e^{j\omega 3t}$
54
$x_4(t)$
$e^{j\omega 4t}$
55
x(t)
23
PREDISTORTION UNIT
24
DAC
21
OUTPUT
31
$|x(t)|^2$
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
25
y(t)
MAIN UNIT FOR CALCULATION
27'
ADC
26
27b
e(t)
81b
G
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
GAIN SETTING UNIT
81a
81
AMPLITUDE CONTROLLER

FIG. 42

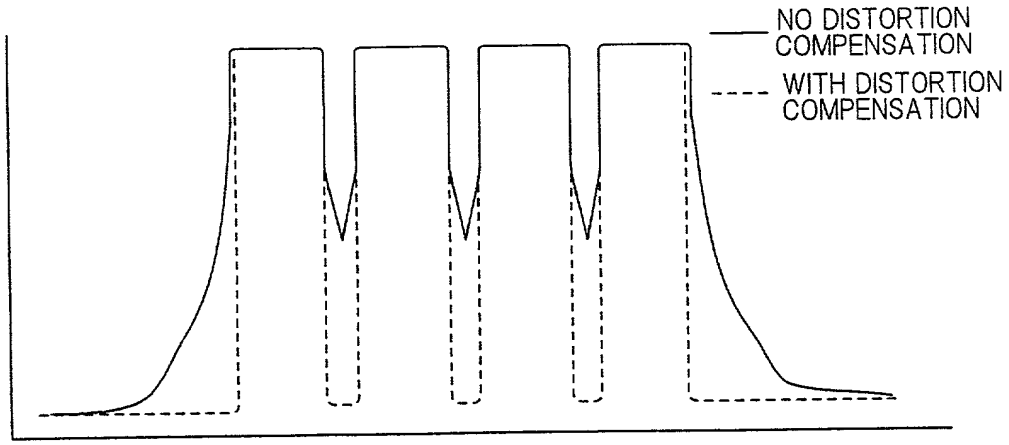
NO DISTORTION COMPENSATION
WITH DISTORTION COMPENSATION

FIG. 43

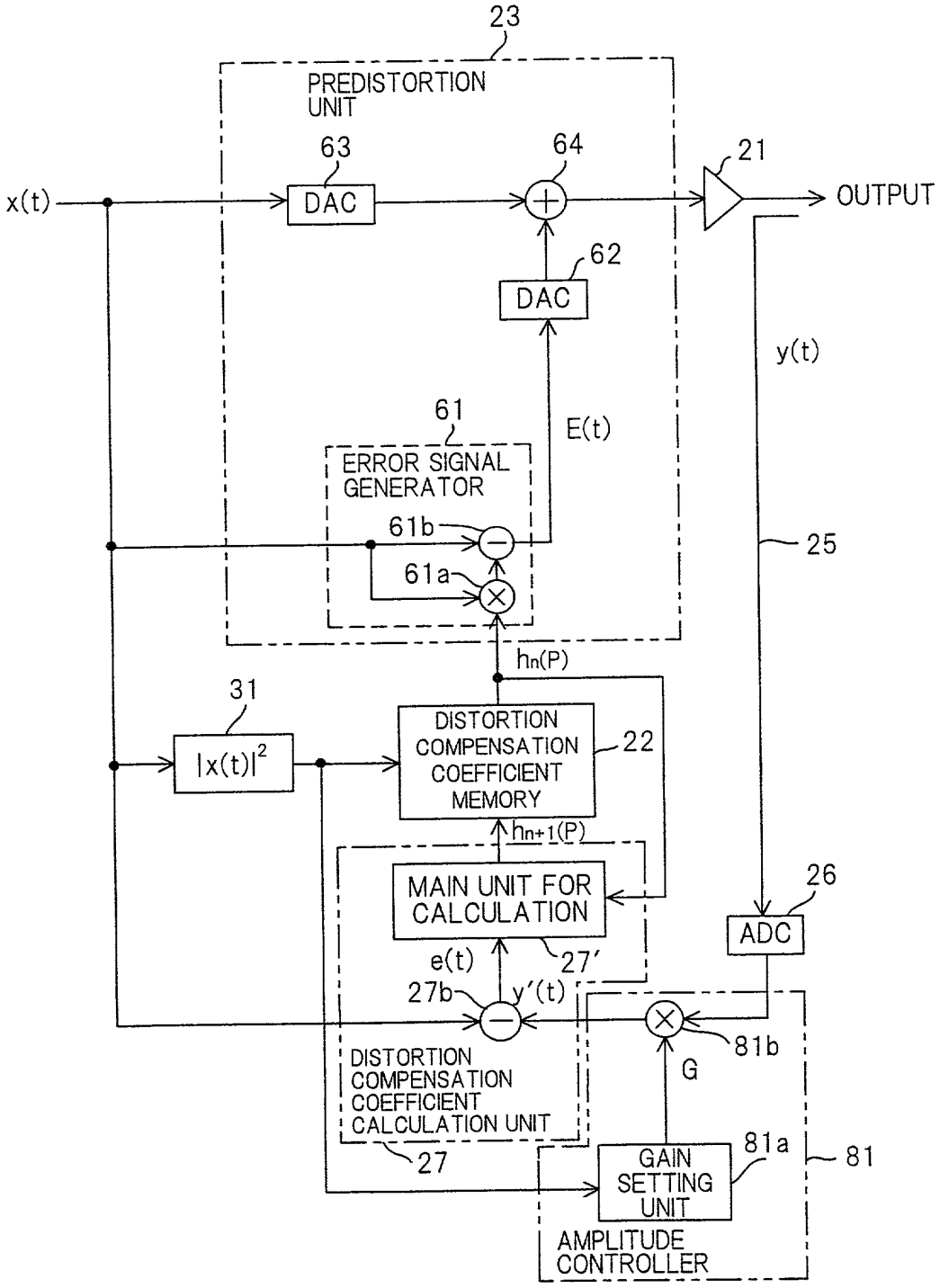
23
PREDISTORTION UNIT
63
64
21
x(t)
DAC
OUTPUT
62
DAC
y(t)
61
E(t)
ERROR SIGNAL GENERATOR
61b
61a
25
hn(P)
31
|x(t)|2
DISTORTION COMPENSATION COEFFICIENT MEMORY
22
hn+1(P)
MAIN UNIT FOR CALCULATION
26
ADC
e(t)
27'
27b
y'(t)
81b
G
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
81a
81
GAIN SETTING UNIT
AMPLITUDE CONTROLLER

FIG. 44

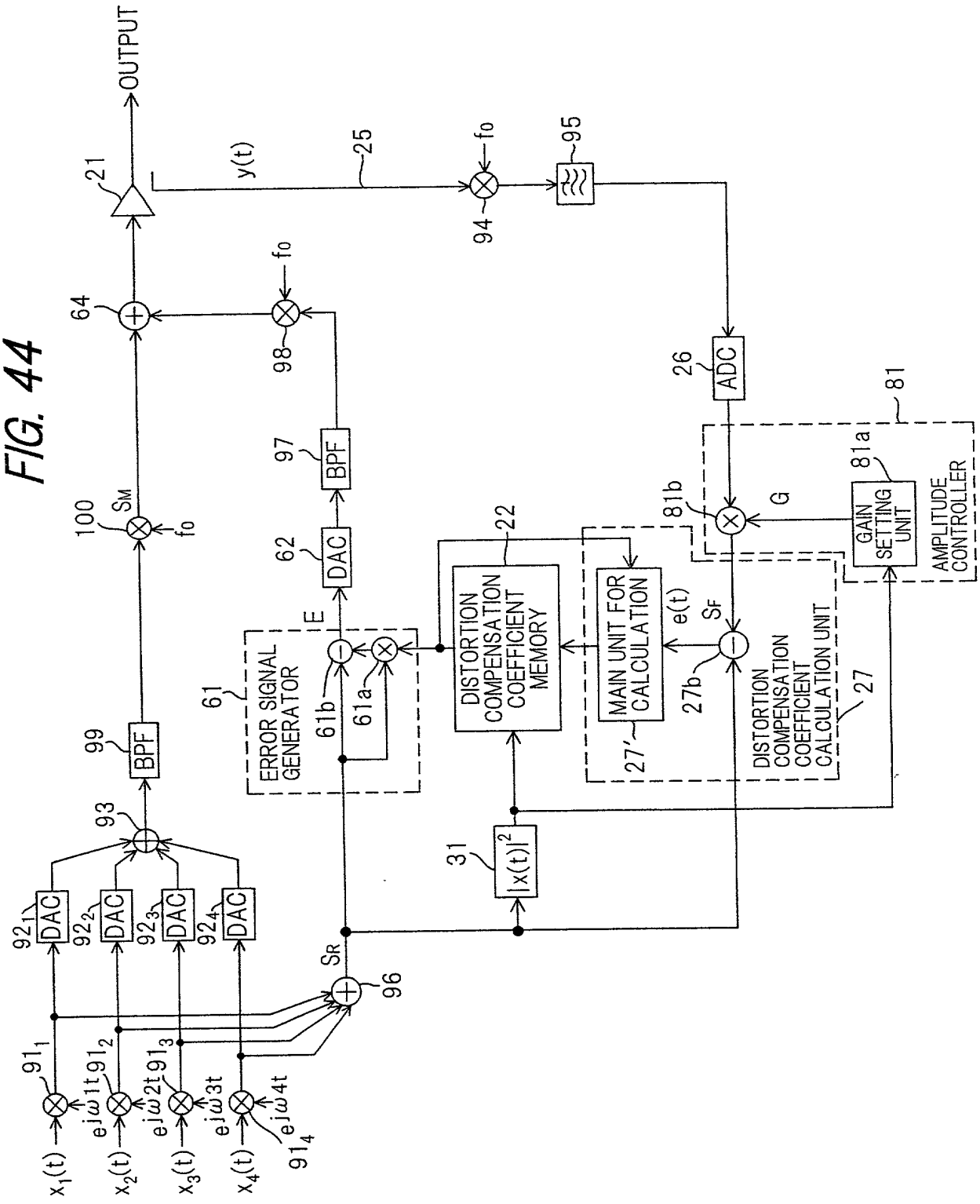
OUTPUT
21
y(t)
25
f0
94
95
64
98
97
BPF
100
SM
f0
62
DAC
22
DISTORTION COMPENSATION COEFFICIENT MEMORY
26
ADC
81
81b
G
81a
GAIN SETTING UNIT
AMPLITUDE CONTROLLER
99
BPF
93
61
ERROR SIGNAL GENERATOR
E
61b
61a
MAIN UNIT FOR CALCULATION
27'
e(t)
SF
27b
DISTORTION COMPENSATION COEFFICIENT CALCULATION UNIT
27
31
|x(t)|2
SR
96
92 1
92 2
92 3
92 4
DAC
91 1
91 2
91 3
91 4
ejω1t
ejω2t
ejω3t
ejω4t
x1(t)
x2(t)
x3(t)
x4(t)

FIG. 45 PRIOR ART

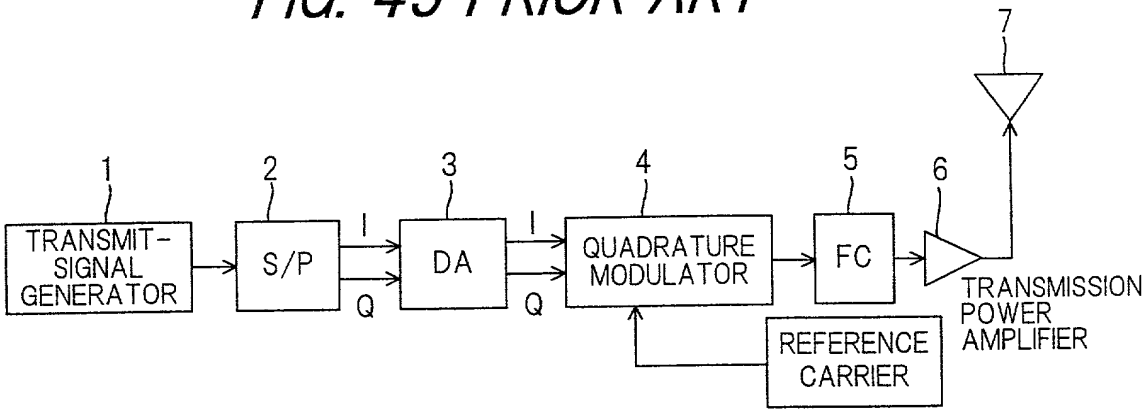

FIG. 46A PRIOR ART

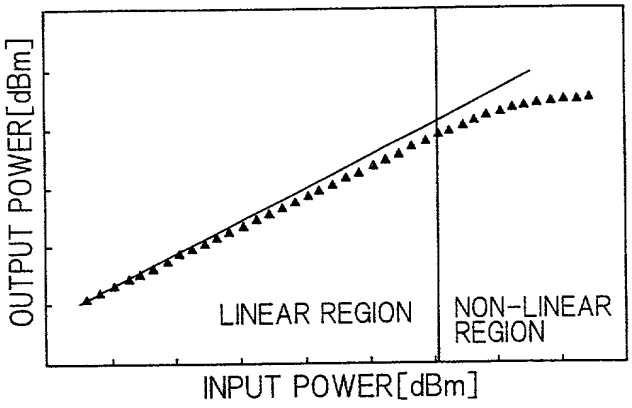

FIG. 46B PRIOR ART

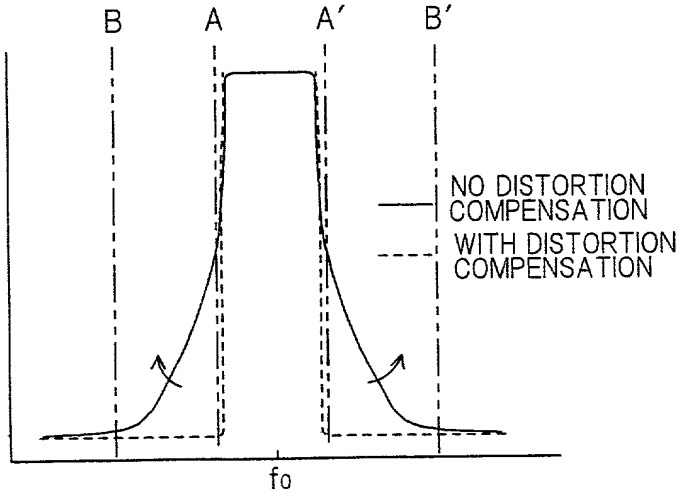

FIG. 47 PRIOR ART

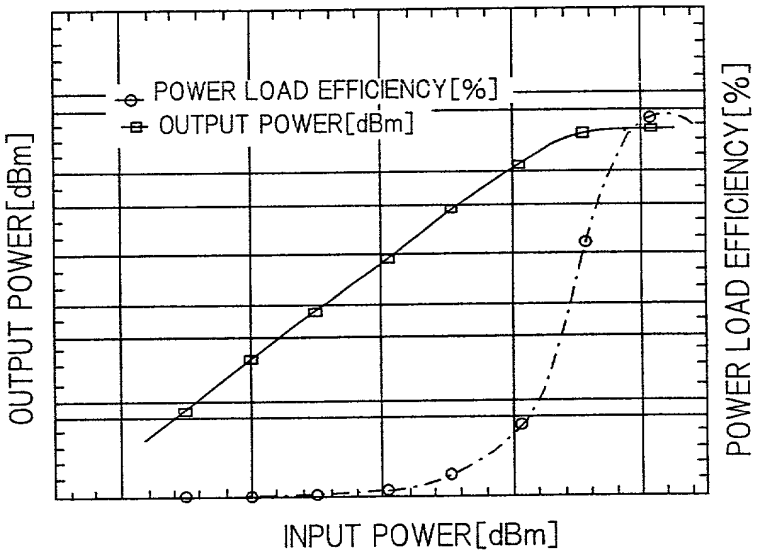

FIG. 48 PRIOR ART

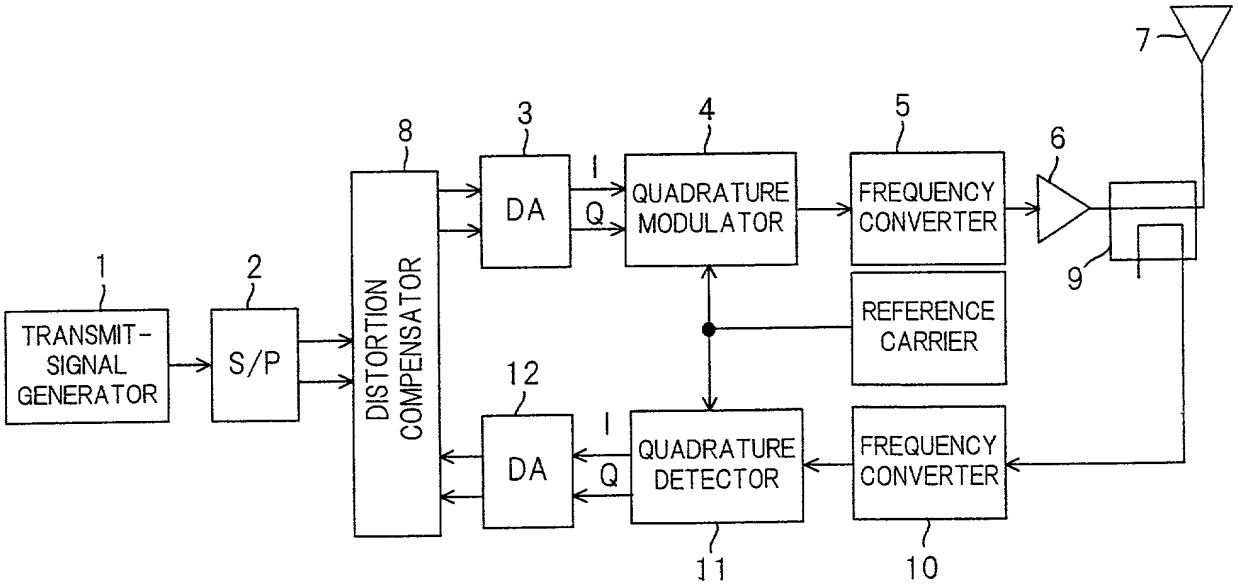

FIG. 49 PRIOR ART

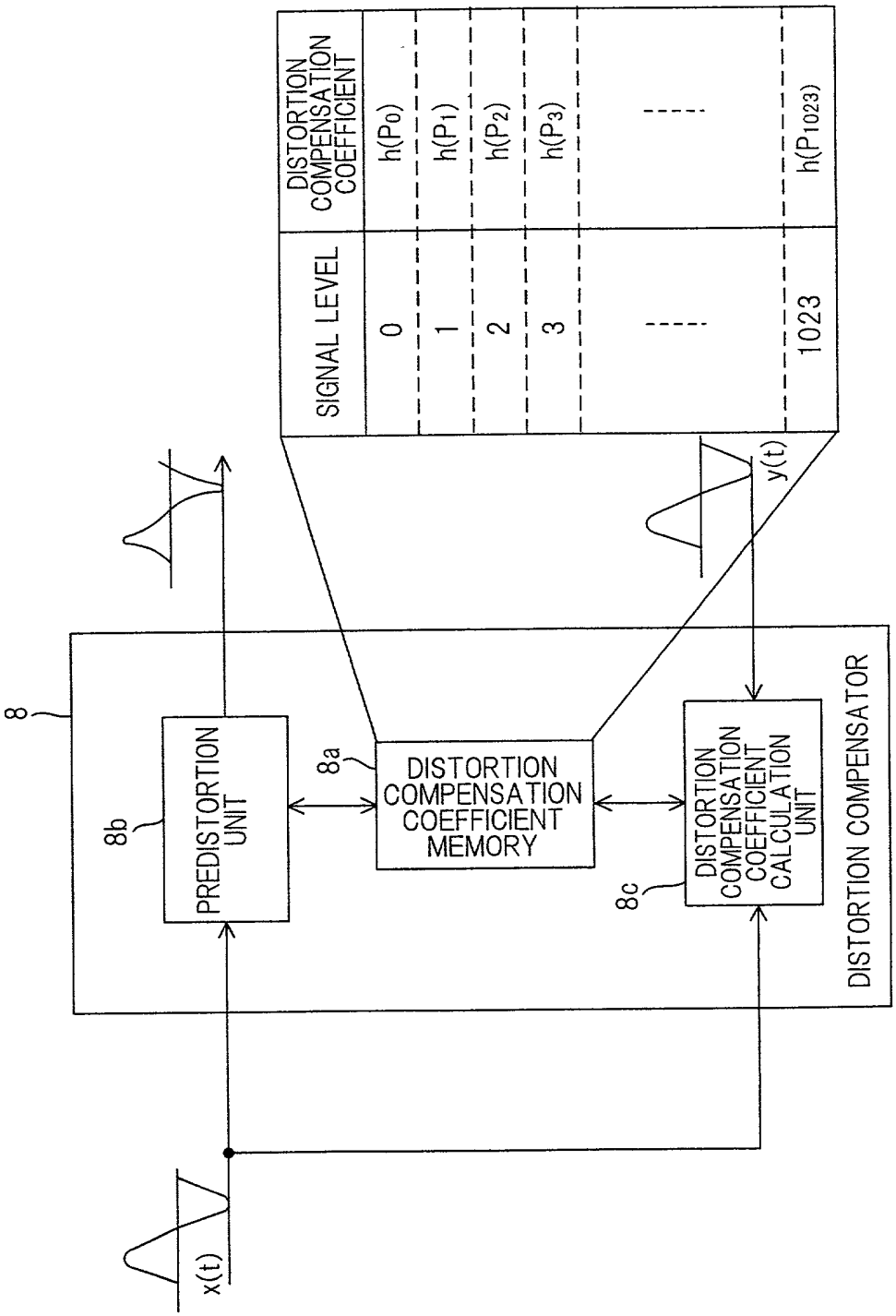

FIG. 50 PRIOR ART

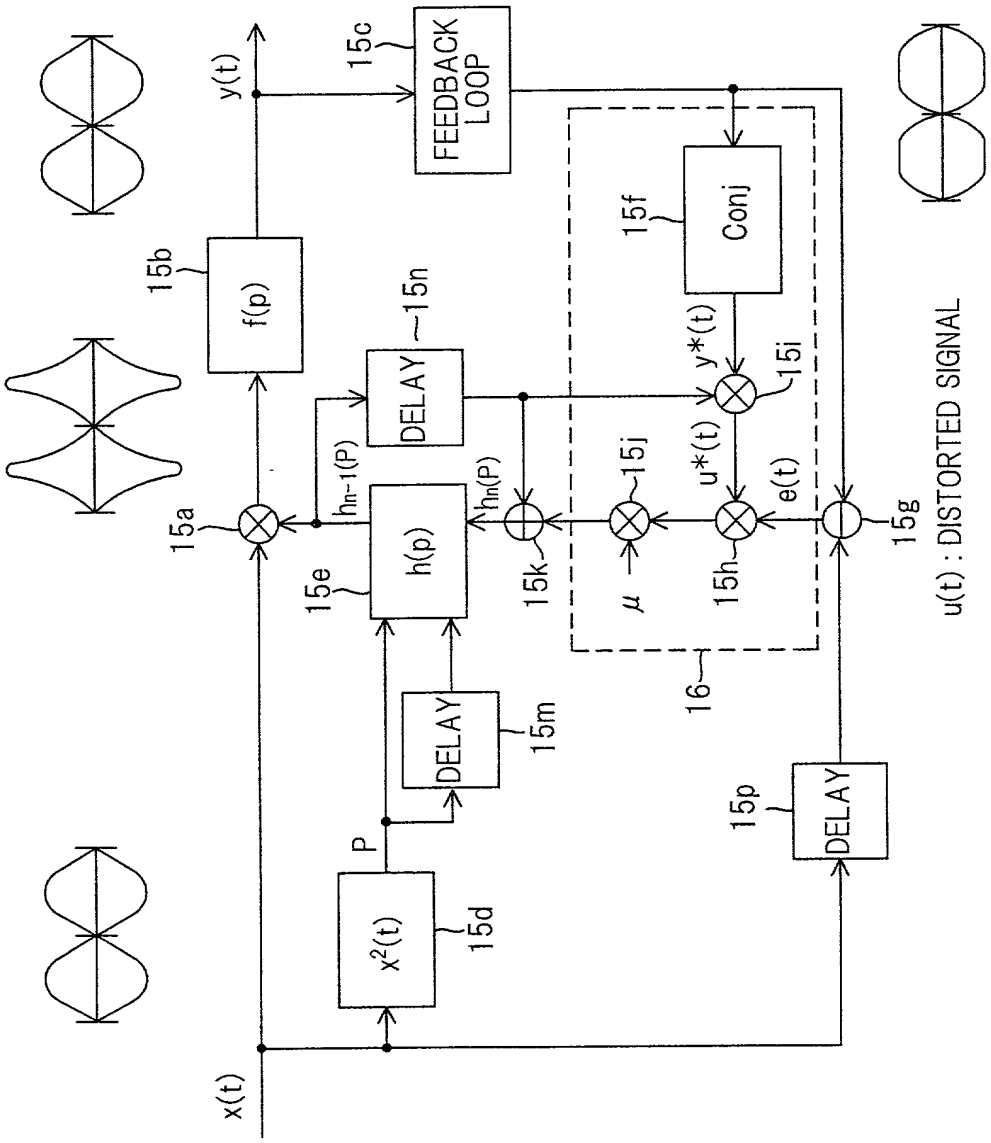

FIG. 51 PRIOR ART

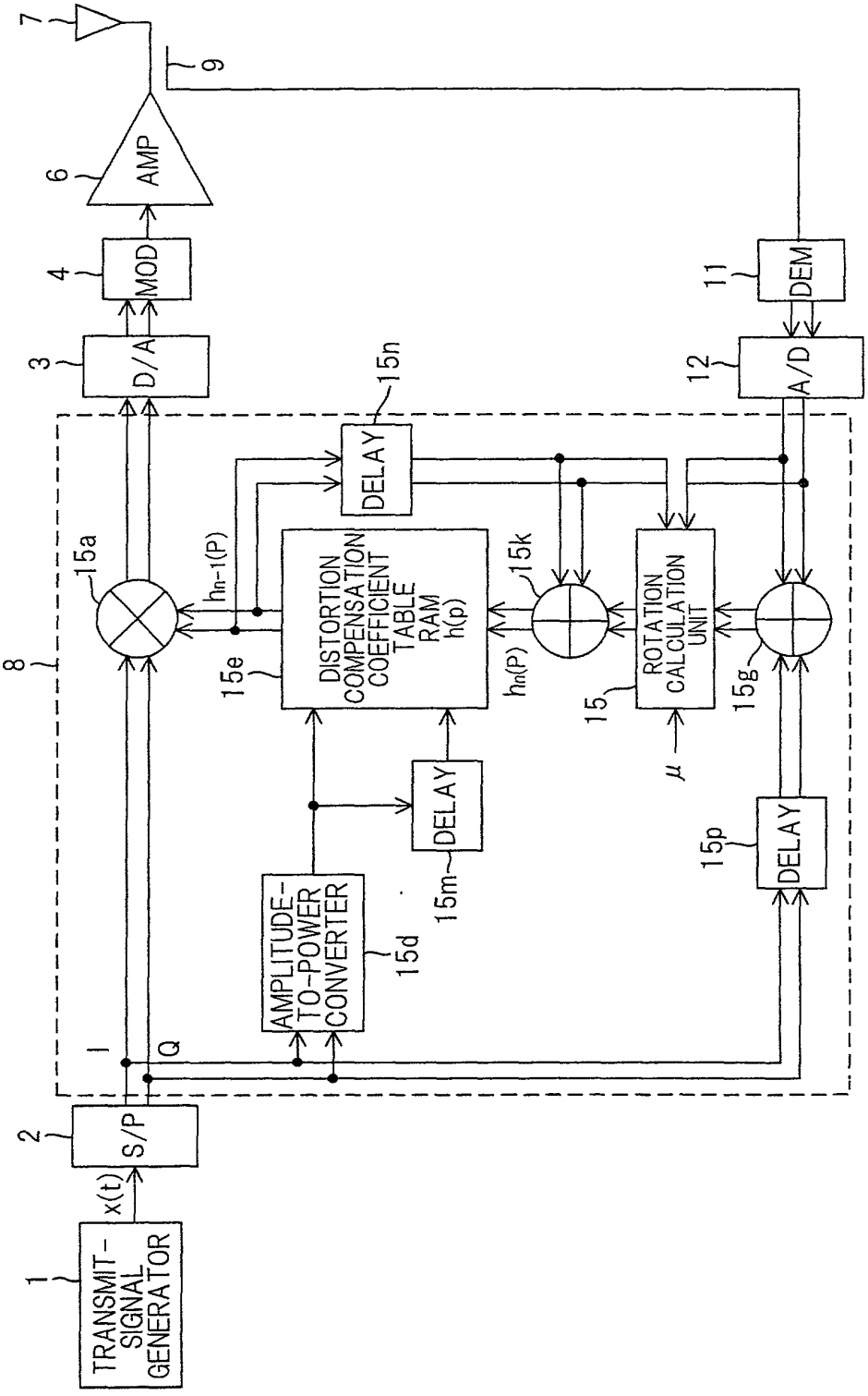

FIG. 52 PRIOR ART